THE ENGINEERING AND MINING JOURNAL.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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MR. SWANK'S REPORT.

IN the last number of the *Bulletin of the American Iron and Steel Association*, a reply is made to our recent criticism of Mr. SWANK's annual report. The substance of this reply is, that the ENGINEERING AND MINING JOURNAL is an organ of British Free Trade, and, as such, "worried" by Mr. SWANK's "plain statements of fact," that Mr. RAYMOND made an unparalleled exhibition of sycophancy in the presence of British ironmasters at Liège; that he is an arrant fool; that he blathers and whines; that the JOURNAL has already begged a *fourth* copy of Mr. SWANK's report; that Mr. WHARTON gave no assistance to Mr. SWANK, and that Mr. RAYMOND's insinuation to the contrary is ungenerous; moreover, Mr. RAYMOND was once interrupted in a public address by a person in the audience who coarsely denied something he had said [something, by the way, which was subsequently proved by sworn testimony in court], and that, therefore, Mr. RAYMOND is one from whom Truth has much to fear. The latter proposition, it should be added, the *Bulletin* puts indirectly, by quoting with approval, and by name, the person referred to—an unnecessary handling of pitch in which we shall not imitate it.

If this is considered legitimate discussion, or warranted by the tone and substance of our criticism, we have only to say that our notions of decency and logic are, unfortunately, too rigid to permit us to join in it. We must decline Mr. SWANK's implied challenge to an overhauling of his private character or personal career, and continue to confine ourselves to his published writings, which we shall be able to characterize plainly enough, without the necessity of calling him a fool, a sycophant, or a liar.

So far as the counter-attack of the *Bulletin* is concerned, it calls for little reply. Mr. RAYMOND's offence at Liège consisted in telling the Iron and Steel Institute of Great Britain that the American Institute of Mining Engineers had nothing to do with questions of tariff and trade, but was, like the British Institute itself, a purely technical society. Why this should be so irritating to the Secretary of the American Iron and Steel Association, it is difficult to see. That Association had very clearly shown, in 1873, just before the Liège meeting, its exclusive devotion to the commercial and domestic, rather than the technical and international, side of the industry it partially represented. It had shown this by the ignominious failure of an attempt to raise the sum of two thousand dollars to pay for the preparation of a report on iron and steel at the Vienna Exposition. The history of that attempt and its failure is at the disposal of the Secretary, if he desires to incorporate it in the records. The Association repeated this demonstration of the limited character of its sphere by its failure, repeated and conspicuous, to obtain the means for collecting and displaying at the Centennial Exhibition the ores, fuels, and products of the ironworks of this country. With that performance it rested content; and has since been satisfied to continue its activity in the channels of its choice, without pretending to a wider range. Mr. RAYMOND's remarks at Liège were, therefore, perfectly true at the time, and have since been abundantly justified.

The *Bulletin* says the JOURNAL has begged four copies of the report in paper covers, but generously offers Mr. RAYMOND a copy bound in cloth with gilt sides and edges, *if he will read it again*. Mr. RAYMOND begs to say that he cannot afford to acquire at such a cost the sumptuous volume referred to. The copy in his possession was bought and paid for, and has been once read. Further outlay of money or time in that line seems scarcely prudent.

The particular wrath of the *Bulletin* is aroused by our two references to Mr. WHARTON, in one of which we said that Mr. SWANK's report bears a suspicious resemblance to Mr. WHARTON's celebrated speeches, while in the other we called it "SWANK's edition of WHARTON." Both these expressions are strictly true. Whether Mr. WHARTON assisted in the report or not, the resemblance referred to still exists, and the report in this respect is simply an echo of Mr. WHARTON's speeches, or, in other words, a new edition of them by Mr. SWANK. As for the *Bulletin's* angry talk about "slanderous criticisms" of one's hosts, we have only to remind it that our criticisms followed, not an after-dinner speech, but *the publication of it* in the *Bulletin*. Mr. WHARTON has been sufficiently punished, however, for that ill-advised performance. We have no desire to persecute him on account of it, or to magnify it until it hides from view his excellent character and great abilities. On the question of protection, we have held him to be a type of that extreme and undiscriminating school represented by Mr. SWANK's report. Perhaps we do him injustice in that opinion. It may be that he shares the disgust which so many members of the association feel at seeing such a document put forth in its name. It may be, also, that he condemns, as many members of the association do, the appearance of scurrility and abuse in its organ, as a pitiful substitute for argument. It may be that, like ourselves, he would be glad to have Mr. SWANK control his temper and put his accomplished mind to answering the questions: What does the *Bulletin* mean by Protection? Is it in favor of prohibitory duties? If so, is it in favor of prohibitory duties on all articles which may be produced in the United States? If not on all, then on how many, and what? If not prohibitory, then how high? May there not be an honest difference of opinion upon such important points? If there is such a difference, is it to be settled by fair inquiry, or by howling about British emissaries and a corrupted press? A little earnest thinking on these topics will be a healthful exercise, and will, doubtless, dissipate the nightmare of British origin which has

"Sat nightly on the knightly breast"

of the Secretary of the American Iron and Steel Association.

To assist him in this work, we offer the following suggestive notes on his own report, for we suspect that even the author of that remarkable document will need a guide of some kind to traverse its labyrinthine argument.¶

The fundamental principle is laid down (p. 15) that the interests of one nation "are never identical with the interests of other nations" in the matter of trade or exchange. That is, in every bargain somebody must be cheated. If it is the interest of the seller to sell, then it is not the interest of the buyer to buy. Query for SWANK: Why the dickens does the buyer buy, then?

Pages 21 and 22 show how British industries were developed by protection, beginning in the first half of the fourteenth century, and lasting through the sixteenth. Page 20 shows the miserable condition of Britain "as late as 1547," agriculture being almost the sole occupation. Query for SWANK: Does putting "1547" on page 20, and "the first half of the fourteenth century" on page 21, make the former antedate the latter?

Page 25 mentions the measures adopted by Great Britain in the eighteenth century to check manufactures in her American colonies. Query for SWANK: These measures being, according to our author, protective, does he consider them wise and right, and worthy of imitation?

Pages 31 and 32 state the grounds on which Great Britain, while "not abandoning her protective *policy*, * * * virtually abandoned protective *duties*." They are said to be, in substance, that the import duties "had ceased to afford much protection;" that manufacturers would be benefited by the removal of duties on raw materials; and that the repeal of duties on agricultural products would help the laborers and lessen their clamor for an increase of wages. Query for SWANK: Would the same state of things in this country justify a reduction or abolition of any *duties*, of course retaining "a protective *policy?*" Moreover (since he says the laborers of Great Britain are no better off than before the abolition of the Corn Laws, though that was, to the British manufacturer, "eminently a measure of protection"), what are his views about protection for the raw materials produced by agriculture and mining.

Pages 50, 51, etc., show the misery, brutality, and ignorance which, it is alleged, Free Trade has inflicted upon the British workman. On page 103, and elsewhere, the superior workmanship and other decisive advantages of American manufacturers are set forth. On page 104, England is credited with "equal skill." Query for SWANK: Do ignorance, brutality, and starvation breed "equal skill" with freedom, common schools, virtue, religion, and a protective tariff? And again, since (page 107 and elsewhere) the advantages of American wages bring over thousands of British workmen, to whom we at once pay high wages, how does the tariff work this miracle upon their alleged brutality, etc.? And once again, what *would* SWANK say if it dawned upon him that wages in England and this country are now, in the iron business and mechanical trades nearly on a par, and that many English workmen are deliberately going back to "slavery?"

We could go on indefinitely with such specimens of crude and contradictory statement; but these must suffice. There is some truth in everything that Mr. SWANK says; we do not doubt, for instance, his story (page 53) about a prize-fight between a man and a dog in Hanley, England, or the accompanying tale of horror about two "shoeless, hungry little girls," who went without meat, that a dog "of the retriever breed" might have a good dinner. Doubt! how could we doubt? Does not some shoeless little girl go without meat, and some retriever or other cur get meat, near Sheffield, or any other place daily? And moreover, behold Mr. SWANK's accuracy; he gives precise authority—"a correspondent of the London *Daily Telegraph, for* 1874, writing from a village in the neighborhood of Sheffield!" But mark the SWANKIAN generalization from these authentic incidents: "Dogs in the Black Country are frequently treated

with far more tenderness and consideration than the children of the pitmen!" This is a good specimen of his way of demonstration—a sweeping statement about the Black Country, backed with a couple of newspaper cuttings having reference to localities in Yorkshire and Staffordshire—not in the Black Country at all? Moreover, as to that dog-fight, we notice that our British exchanges declare the thing to be a hoax. Perhaps Mr. SWANK had better take it out and substitute the serious account which appeared a few weeks ago in the New York *Sun* of a similar fight between a man and a dog—*in Pennsylvan'a!*" In that case, the dog had to be killed, to get him off the man. He deserved to be killed: it was not merely an individual he was chawing up, but one of SWANK's pet arguments? *

NEW PUBLICATIONS.

BOOKS RECEIVED.

THE GOLD MINES OF GILPIN COUNTY, COLORADO. By S. CUSHMAN & J. P. WATERMAN, Central City, Col. Price 75c.

HISTORY AND REVIEW OF THE MINERAL RESOURCES OF LAKE SUPERIOR. By A. P. SWINEFORD, Marquette, L. S., Michigan.

A PRACTICAL TREATISE ON COAL MINING. By G. G. ANDRÉ. Published by E. & F. N. SPON, New York and London. Price $2.50.

MANUAL OF THE RAILROADS OF THE UNITED STATES. POOR, New York. Price $5.

NARROW GAUGE RAILWAYS. By H. FLEMING, Philadelphia.

HARPER'S MAGAZINE. For October.

APPLETON'S JOURNAL. For October.

We shall take an early occasion to review several of these works.

INTERNATIONAL EXHIBITION OF 1876.

Special Report of the Engineering and Mining Journal.

ADMISSIONS FOR THE WEEK ENDING SEPTEMBER 12,* 1876.

Date.		Paying Visitors.	Press, Complimentary, and Exhibitors.	Total Visitors.
Previously reported.....	.....	2,810,837	1,032,374	3,843,211
Sept. 6	103d Day..	58,440	10 825	69 265
" 7.....	104th " ..	63,989	10,985	74,974
" 8.....	105th " ..	58 908	11,340	70,248
" 9.....	106th " ..	103,314	12 023	115.337
" 11.....	107th " ..	41,509	11,410	52,919
Totals.....		3,136,997	1,088,957	4,225,954

* September 12 is not yet officially reported.

BRITISH COAL PRODUCTION STATISTICS.

THE following table, compiled from the reports of the Inspectors of Mines, furnishes, in little space, a vast amount of suggestive information. We have already called attention to the enormous increase in the production of coal in Great Britain. During the year 1875 the output exceeded that of 1874 by 7,716,377 gross tons, or about one-sixth of the entire production of the United States last year.

The very high prices of coal during the years 1873 and 1874, accompanied by the very high rates of wages, led to a considerable decline in production in the latter year; and this decline seems to be due to the fact that the output per man employed has declined to a very marked extent in late years, and in 1874 attained a minimum of 244 tons to the male employed; in 1873 it was 269; in 1870, 322; which seems to have been a maximum. From 1864, which is the first year in which any report was made of the number of persons employed at the British collieries, up to 1871, the production varied only from 302 to 322 tons per male employed. There is no doubt, therefore, but that high wages induced idleness. During 1875 heavy reductions in wages were made, and we find the output again somewhat increased; it was then 254 tons, as against 244 tons the previous year.

The British mines are much better worked now than they formerly were, a fact due, probably, to a great extent, to the government inspection, and to the influence of better scientific training among those in charge of them. The tons of coal raised per life lost has enormously increased. In 1854 (three years after the first appointment of inspectors) which is the first year in which the amount of coal raised was even approximately estimated, there were but 61,735 tons raised per life lost. This amount has steadily increased with a few checks caused by one or two disastrous "accidents." In 1860 it was 75,675, in 1865 it had attained 100,519, in 1870, 113,900, and in 1873, 128,680 tons, which was the highest amount yet obtained at the cost of one life in the British coal mines. In 1875 this had fallen to 114,722 tons.

It is noticeable, also, that the production from each mine has not increased with improvements in winding machinery, in underground haulage, etc. In 1875 the average output of each mine was 29,990 tons, in 1874, 29,314 tons, in 1873, 38,654 tons, while in 1870 it was 35,925 tons, in 1865, 30,766 tons, in 1860, 28,711 tons, and in 1855, 23,616 tons to the mine.

Did space permit we might continue to draw interesting lessons with regard to the influence which this most active exploitation of the mines and the thickness of the veins worked have had upon the percentage of different classes of accidents. Such comparisons form a very interesting and valuable chapter in the Statistics of Coal.

BRITISH COAL PRODUCTION AND LOSS OF LIFE IN COAL MINES FOR THREE YEARS.

1873.

Name of District.	No. of Mines.	As Computed by each Inspector for his own District.		Lives Lost.				Number employed per life lost.	Tons raised per life lost.
		Tons of Coal raised.	Males Employed.	Explosions of Fire Damp.	Falls of Coal and Roof.	In Shafts.	Miscel'neous in mine & at surf.	Total.		
Northumberland, Cumberland, N. Durham.	221	13,471,104	47,208	....	48	12	35	95	496	145,023
S. Durham & Westm'ld, & N. Riding Yorks're.	175	17,438,017	53,357	1	35	6	34	76	702	235,543
N. & E. Lancashire.....	40	8,063,855	31,882	2	38	14	20	74	43	109,750
W. Lancashire & N. Wales	273	10,288,583	42,300	3	42	28	30	131	330	32,303
Yorkshire.....	491	15,311,778	57,525	12	52	18	33	115	496	131,304
Derby, Notts, Leicester, and Warwickshire.	210	11,523,407	46,974	4	39	10	25	78	594	149,263
North Stafford, Cheshire, and Shropshire.	240	6,257,468	20,621	25	20	4	11	60	397	120,226
S. Stafford, Worcester....	433	11,100,500	36,829	4	32	12	25	73	478	151,345
Monmouth, Gloucester, Somerset, and Devon.	326	6,749,264	35,357	7	37	8	17	69	471	98,735
South Wales	350	11,473,152	45,471	11	62	18	21	116	392	98,906
East Scotland.....	290	10,142,039	35,734	....	32	21	11	64	558	158,469
West Scotland.....	237	6,715,733	22,721	3	18	12	16	49	465	137,055
Ireland.....	37	135,731	1,950	....	....	....	....	....	....	....
Totals and Averages	1,220	128,680,131	477,001	100	455	162	282	1,000	478	128,680

1874.

Northumberland, Cumberland, N. Durham.	209	13,692,272	49 129	....	27	9	32	68	722	206,755
S. Durham & Westm'ld, & N. Riding Yorks're.	178	17,912,143	55,696	2	24	14	36	76	733	247,317
N. & E. Lancashire.....	372	8,063,974	32,858	6	31	11	27	7	438	108,350
W. Lancashire & N. Wales	305	9,875,702	43,658	23	41	2	30	116	380	86,755
Yorkshire.....	516	14,827,313	62,499	30	46	8	25	109	558	135,910
Derby, Notts Leicester, and Warwickshire.	416	12,232,296	52,379	3	23	6	23	55	903	215,948
North Stafford, Cheshire, and Shropshire.	240	6,289,929	31,744	78	23	15	19	135	214	62,921
S. Stafford, Worcester....	487	8,500,000	31,836	2	16	12	20	50	636	170,000
Monmouth, Gloucester, Somerset, and Devon.	83	6,815,787	34,852	1	35	3	25	64	490	101,109
South Wales.	363	11,452,358	51,513	11	53	25	38	127	384	87,789
East Scotland.....	360	10,182,326	43,348	7	30	11	14	62	628	164,978
West Scotland.....	407	6,666,333	22,620	3	26	8	5	4	538	157,293
Ireland.....	4	139,213	1,651	....	....	....	..	....	...	....
Totals and Averages	1,28	125,500,108	513,753	166	375	143	291	978	525	128,415

1875.

Northumb-rland, Cumberland, N. Durham.	216	14,042,822	50,070	4	24	5	40	73	68	196,812
S. Durham & Westm'ld, & N. Riding Yorks're.	211	19,459,248	58,622	1	35	10	30	76	771	261,796
N. & E. Lancashire.....	373	8,881,137	33,006	2	38	11	24	75	440	119,581
W. Lancashire & N. Wales	313	11,398,032	45,136	6	62	29	32	129	349	88,845
York-hire.....	520	15,855,930	62,190	162	6	11	28	263	234	60,962
Derby, Notts, Leicester, and Warwickshire.	422	12,430,600	52,477	1	26	17	21	65	783	188,699
North Stafford, Cheshire, and Shropshire.	250	6,116,194	30,056	46	14	9	20	89	286	78,494
S. Stafford, Worcester....	573	10,300,000	35,678	6	36	12	21	75	474	129,944
Monmouth, Gloucester, Somerset, and Devon.	405	6,113,341	34,136	32	32	8	11	83	397	74,852
South Wales.....	363	9,983,341	51,248	20	45	22	39	126	404	80,903
East Scotland.....	379	11,419,619	41,314	2	25	13	18	59	695	198,614
West Scotland.....	372	7,177,888	30,348	5	20	7	13	4	523	156,330
Ireland.....	4	128,201	1,541	....	2	....	2	4	386	32,815
Totals and Averages	1,44	133 306,485	525,815	287	422	154	299	1,162	45	114,722

AMERICAN INSTITUTE OF MINING ENGINEERS.

AUTHORS of papers read before the Institute are entitled to twelve copies of the ENGINEERING AND MINING JOURNAL containing their papers. These copies will be sent on application to the Office of the Journal, or the Secretary of the Institute, immediately after the appearance of the papers. Back numbers cannot always be supplied.

EASTON, Pa. THOMAS M. DROWN, Sec'y.

NOTES.

CHICAGO COAL TRADE.—At a recent meeting of the Chicago Coal Exchange, the Secretary reported the receipts of coal by lake to date, as follows:

	Anthracite, tons.	Bituminous, tons.
Up to last report.....	174,744	174 418
For week ending Sept. 9.....	15.596	5,885
Total	190,340	180,303

The Secretary also reported the receipt of a telegram, as follows:

"Erie, Pa., Sept. 8, 1876.—A. D. WALDRON, President Chicago Coal Exchange: At a meeting of the miners and shippers of coal, held here to-day, they ordered a reduction of 50 cents a ton on hard coal, to take place on Monday morning for cash, only, when coal is ordered. ROBERT LAW."

Mr. ENDACKER moved the acceptance of the report, with the understanding that there should be a reduction of 50 cents per ton. Mr. J. H. LITTLE offered as an amendment that the reduction be fixed at $1. After a long discussion the original motion prevailed.

Prices.—The new scale of prices of coal, at retail, delivered to city consumers, will be as follows, from and after Sept. 11: Large and small egg, $7; chestnut, $7.25; range, $7.50. Lehigh coal will be sold at an advance of $1 per ton over the above prices it being a superior quality to that in general use.

It is not unlikely that the hard coal dealers of this city, nearly all of whom made their contracts a month ago, before the Combination broke, will have a severe Winter of it, unless their Eastern brethren let up on them.

BLOWING AND VENTILATING MACHINES AT THE PHILADELPHIA EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

THE same general methods and forms of machines as are used in moving liquids are also employed for moving gases. The differences with regard to specific gravities and elasticity, which exist between liquids and gases, make necessary, however, some modifications in the form and arrangement of the apparatus used. Where it is necessary, in the case of pumping liquids, to allow some time for the closing of pump valves in blowing engines the low density of the gas permits their closing quickly without great shock. Another feature which distinguishes the construction of liquid from gas moving machines is, that while in the one case great strength and solidity have to be aimed at, where the liquids are forced to considerable heights, or under heavy pressures, gas-forcing machines are generally made for the delivery of large volumes at low pressures. But few cases arise where it is necessary to move or force other gases than nearly pure air or illuminating gas, which, however, are sometimes burdened with mechanical impurities. The high elasticity which gases possess make it necessary to construct machines which are used in forcing them in such a manner as will allow nearly all the gas which is exposed to pressure, to be expelled without again being uselessly expanded.

In most cases where it is found necessary to use air in considerable quantity, and at pressures ranging upward, from 2 lb., or even less, piston-blowing engines, with closely-fitting inlet and discharge valves are employed. When blast is required at pressures ranging from ½ lb. to 2 lb., and, under certain circumstances, as much as 6 to 8 lb., rotary blowers, which, like piston blowers, force the air or other gases, are generally made use of. Made without valves, delivering the gases nearly continuously, and being capable of working at considerable speed, and thereby having a large relative capacity, this kind of machine is now largely used in place of piston engines. One necessary element in their construction, however—that of looseness of working parts—prevents them from being used, where it is necessary to force gases at considerable pressures. A third class of machines are those which employ the principle of centrifugal force for their action. The numerous kinds of fan-blowers belong to this class. When well constructed, they are successfully employed in cases where it is necessary to move gases through free passages at quite low pressures. The low specific gravities of all gases makes it important that the fans in these machines should move at very high velocities, in order to give the necessary impulse to the gases being moved. Where gases, laden with dust or other mechanical impurities have to be moved, these fan-blowers are specially applicable, as these moving parts are not liable to wear by friction, as they are very loosely fitted, in these cases, in those parts against which the solid matter is driven.

Another class of machines for producing gas motion is that in which a direct water pressure is used. These machines are only applicable where there is a natural head of water and are not widely used. The principle on which GIFFARD constructed his water injector is now used as a means of producing vacuums or blast pressure. Water, steam, and even compressed air are used as a source of power, and in some cases this class of apparatus works well.

Still another means of producing air currents and even considerable pressures is that of rarefication by the aid of heat. Nearly all the different classes of air and gas moving machines which have been enumerated are represented at the Exhibition. Of blowing engines for blast furnaces or cupolas there are three full size working machines. One is a vertical direct-acting reciprocating fly wheel engine, built by I. P. MORRIS & Co. of Philadelphia, another by P. L. WEIMER, of Lebanon, Pa., is of the same general type, while the third is a horizontal direct-acting engine, without fly wheel, which is exhibited by the Knowles Pump Company of Boston.

I. P. MORRIS & CO.'S ENGINE.

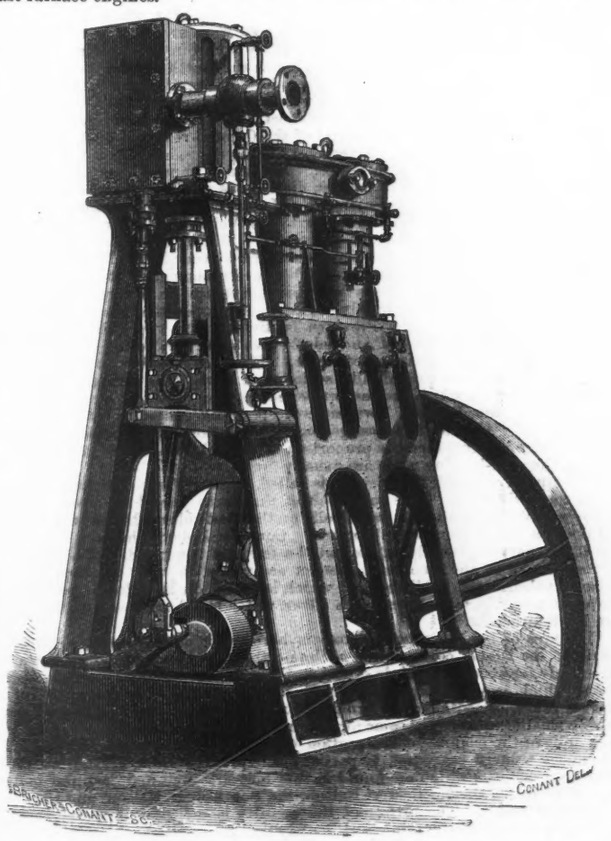
The engine belonging to I. P. MORRIS & Co. is typical of nearly all the blowing engines constructed by them. Its total height is 36½ feet from the floor level. The blowing cylinder, which is 90 inches in diameter, is placed above the steam cylinder, and is supported by two pairs of iron standards which are braced by means of the guide frames to the main piston rod. The steam cylinder, which sets on short standards which are bolted to the bed-plates, is 5 inches in diameter. The stroke of the engine is 84 inches. The fly wheel shaft is directly under the center of the steam cylinder and runs in bearings which are bolted to the bed-plates. Two fly wheels, each 24 feet in diameter and each weighing 39,770 lb., are fastened to the ends of the fly wheel shaft. They are connected with the cross-head of the engine, which is keyed on the piston rod between the two cylinders by long connecting rods. The steam valves are of the equilibrium pattern and are operated from a cam shaft, which is before the steam cylinder and nearly at the level of the bed-plates. Motion is given to this cam shaft by geared wheels from the fly wheel shaft. The condenser, which is not operated on this engine, owing to the lack of sufficient water, is of the jet variety, and stands directly back of the steam cylinder. Back of this is the air pump, which is operated by unequal armed levers which are connected by link bars to the main cross-head. The condenser is made to serve as a standard to support the levers which work the air pump. Owing to the scarcity of steam, the engine, although kept running, is not engaged in pumping air, all the valves being removed. Its maximum capacity is, however, 10,740 cubic feet of air per minute.

THE WEIMER ENGINE.

This engine belongs to a class which is held in great favor by many furnace managers. It is a small, compact, direct-acting vertical engine, and made to run at high speeds. In general arrangement it is like the engine just described; the blowing cylinder, however, being supported by a solid cast-iron standard circular at the top, and having an arched opening in front to permit access to the steam cylinder and other parts. The guides to the cross-head, which works between the two cylinders, are also cast in the same piece. The steam cylinder is twenty inches in diameter, and has a piston stroke of twenty-four inches. It has an ordinary slide valve, which is operated by a link motion, the whole arrangement of which has been very compactly designed. The blowing cylinder, which is fifty inches in diameter, includes several novel features. In order to admit of the engine being run at the high speed for which it was designed, it was necessary that the valve areas should not only be large, but that they should open and close quickly. The inlet valves to the blowing cylinder are arranged in six sector-shaped boxes, which are keyed into the cylinder heads. These cylinder heads are in plan like a six-spoked wheel, the piston rod passing through what corresponds with the hub-center. In each of the six valve boxes, which are at either end of the cylinder, there are five valves. Four of these are at the sides, the one nearest the center being quite small. The fifth one is placed at the bottom of the box, the top being left open for the admission of air The valves are of the gridiron variety, the leather being held between two gridiron plates so as to have a play of about ⅜ of an inch. The plates are gridironed, so that when the air is being drawn into the cylinder, holes which are cut in the leather, correspond with holes in the inner plates. The discharge valves, which are similar to those just described, are placed at the outer side of the sectoral box, from which they convey the air into an annular passage way which surrounds the cylinder. As will be seen from the description given, much space is left in the inside of the cylinder, both between the valve boxes and the discharge valves, which would not be entered by an ordinary piston. In order to avoid the considerable loss of power which would result from leaving these spaces filled with compressed air at the end of each stroke, the piston has cast upon both its upper and lower sides radial and circumferential ribs, or flanges, so that when the piston is at the end of its stroke, the ribs on one of its sides have entered the spaces between the valve boxes and displaced nearly all the contained air. When working at 100 revolutions per minute, these engines are calculated to discharge 5,000 cubic feet of air at 10 lb. pressure. The general construction and workmanship on this engine are of the best kind.

AIR COMPRESSORS.

This is a class of machines whose use has sprung up within the last few years, owing to the necessity for them in driving rock drills, sinking pneumatic caissons, operating air brakes, and sometimes as a means of transmitting power for ordinary uses. The air is generally compressed in these machines to such an extent that it becomes necessary to take out some of the heat generated by means of water jackets or spray jets. In this feature, and also in the construction of the valves for high pressure duty, the compressors differ from blast furnace engines.



THE BURLEIGH COMPRESSOR.

This machine, which is displayed by the BURLEIGH Rock Drill Company, in Machinery Hall, shows the marks of having been the result of much thought and experience. It is the last form of compressor which has been designed for the company by W. W. BAILEY, their superintendent. The steam cylinder, whose dimensions are 18×24 inches, is mounted vertically on a frame which carries the two air compressing cylinders in the same line with it. A horizontal three-cranked shaft is connected with the steam and air blowing cylinders, which are above it by connecting rods. The air cylinders are single acting, and the cranks are placed so that the steam piston is ⅛ of a full stroke behind each air piston when it is forcing.

The air cylinders are made with passages at the side for the admission of air, which passes into the cylinder through valves opening upwards, which are in the piston heads. A head with stuffing-box is placed on the lower sides of these air cylinders, for the purpose of preventing the water, which is forced in with the air during its compression, from descending through the valve in the piston, and thus keeping the lower part of the machinery wet. The water, which is forced in the upper parts of these cylinders, absorbs the heat generated by the compression, and the larger part of it passes off with the compressed air into the receiver from which it is conveyed to the workings. The steam cylinder is fitted with the Putnam Machine Company's Poffet valves, with variable cut-off, which are modified in arrangement by having the steam and exhaust pipes enter at the side of the steam chest instead of in front, thereby rendering the construction much more compact. The valvet cams are driven by spur wheels and bevel gearing from the main shaft, and are geared so that the cam shafts revolve at ½ the speed of the main shaft, necessitating two cams in place of one for each valve. This compress is capable of running up to 70 revolutions per minute, and will deliver air at nearly the same pressure as that

of the steam which moves the air cylinders. Photographs which are shown of other compressors made by the same Company, represent smaller machines, operated by plain slide valves, and not having the bottoms of the air cylinders covered with tight heads.

The cost of fuel in some mining districts in the Far West has necessitated the construction of machines in which the steam can be used more expansively and consequently more economically than in those engines filled with plain slide valves. Another of the photographs shows a special compressor, made for the United States Government, for use in liquifying carbonic acid at Newport, where the torpedo experiments are carried on. In general finish and thoroughness of construction, the compressor exhibited by this company is superior to all others displayed at the Exhibition. Space will not permit us to mention the places at which these compressors are at work, but it may be mentioned that at the mines in and around Virginia City sixteen are in use.

TO BE CONTINUED.

GOLD EXHIBITS AT THE PHILADELPHIA EXHIBITION.—IV.

Special Correspondence of the Engineering and Mining Journal.

(*Continued from page* 167.)

NEW ZEALAND.

THE production of gold in this colony ranks third in amount, when compared with Victoria, 8,025,676 ounces having been found between the years 1862 and 1875. The discovery of the precious metal was made, as in Australia, long before any attempt to mine it was undertaken. In 1842 an exploring party, under Captain Wakefield, found gold at Massacre Bay, which lies at the northern extremity of the South Island, or lower half of New Zealand. Nothing resulted from this discovery, and not till 1852, when the gold fields of Australia began to excite so much interest, were any further developments made. In that year gold was simultaneously found in the Provinces of Otago and Auckland, the former Province lying in the north central portion of the North Island, and the latter occupying the southern extremity of the South Island. These discoveries, however, were not followed up, only 1,100 ozs. having been obtained in the Auckland District before it was abandoned again. In 1856 C. W. LIGAR, Surveyor-General of the Colony, reported that he had discovered gold on the Matauri River, and during the same year it was found in the Provinces of Nelson and Otago. Not much impulse was given to gold mining until in 1861 two important discoveries were made, which started a genuine gold fever. A man named G. HEAD, in prospecting for gold, found rich pay dirt on one of the tributaries to the Waitahuna River, so that in one day he obtained seven ounces of the metal. During the same year two men named HARTLEY and REILLY, after three months' work in the Molyneux River, obtained 87 pounds of gold dust. The government gave them a bonus of £2,000 for disclosing where they had obtained it, and in a very short time the Otago field was pretty thoroughly explored. On consulting a map of New Zealand it will be seen that the Province is divided into two principal islands having a common north-east and south-west axis, they being separated from each other by a short interval of water. If joined together the shape of the two islands would be roughly like an inverted boot. The geological structure of the two islands, which has been quite thoroughly studied, is quite diversified, the strike of the different horizons corresponding generally with the axis of the islands. All the principal geological formations are represented, among which there is a considerable proportion of the Silurian slates and schists, in which the gold-bearing veins are usually found.

The upper, or North Island, as it is called, is covered to a considerable extent with trachytic lavas. The gold fields of the North Island are situated in the Province of Auckland, and principally on the west side of the mountains lying at the east side of the Gulf of Hauraki. Considerable gold has also been found in the tertiary deposits lying around the town of Auckland. The auriferous quartz rocks of the Auckland District are found in veins in propylite, and also in volcanic ash. All the gold which is found on the North Island is alloyed to a considerable extent with silver, which is not the case with that found on the South Island.

The area of gold-bearing territory is here much more extensive. A broad strip of the island, commencing at the northern end and extending down the west side for about two-thirds of its length, and then widening out into a broad band which crosses over to the eastern coast, is geologically composed of Silurian rocks, or sedimentary formations resulting from them. Two comparatively smaller areas of the same formation are found in the northern and southern ends of the island. That portion of the area just spoken of, which lies along the western sea coast, is partially occupied by older crystalline rocks. The gold deposits which are found in this belt are included in three general divisions called the North-west Nelson, the Sou'h-west Nelson, and the Westland Gold Fields. The surface of the country is mountainous, and is intersected by many streams, which ultimately flow into the sea, either on the north or west coast. It is from these stream-beds that most of the gold yet found has been obtained. The most important deposits found in the North-west Nelson fields were included between the Aorere and Jakaka Rivers. Prof. HOCHSTETTER, who has very carefully examined this region, has found that the gold-bearing quartz veins occur invariably in mica slate and clay slate rocks. These slate rocks have been largely broken up, and by washing they have formed great conglomerate masses covering the foot hills and valleys to depths of sometimes as much as 20 feet. These quartzose conglomerates contain gold, and it is from them by the concentrating action of streams that the rich, modern alluvial deposits have been formed. Improved methods of working will, in time, make these extensive deposits of gold-bearing conglomerate profitable to work. An estimate made by Prof. HOCHSTETTER of the amount of gold contained in the Aorere River alone, was £22,500,000.

The Otago Gold District is situated in the broad band of schistose rocks, which extends across the island from north-east to south-west, and which is joined with the rocks of the gold fields of the west coast. The country is intersected by streams which flow southward into the sea on the east side of the island. The rock formations vary from mica slates to indurated sandstones and shales. It is characteristic of these rocks to seldom find them protruding at the surface, unless highly impregnated with quartz. On the surface of these formations occur extensive basin-like valleys that appear at one time to have formed a series of lakes, into which the detritus of the surrounding rock accumulated. Palæozoic and secondary rocks surround, in places, these schistose rocks, the palæozoic rocks being characterized by layers of limestone, while thin beds of coal are found in the secondary rocks. Tertiary and volcanic rocks occupy a narrow strip along the eastern sea board, and extend from thirty to forty miles up the river. These tertiary deposits include several important gold fields.

The way in which the gold has been extracted from the schistoze rocks and deposited in the interior valleys, has been very thoroughly studied by Dr. HECTOR. As typical of all these formations he particularly describes the great basin which is formed by a succession of parallel ridges of compressed highly altered sedimentary rocks, which includes the Upper Tauri Plains, Idaburn Valley, and the Mannherikia Valley. This basin is drained by the Taieri and Molyneux Rivers, which in both cases have cut through the rock formation to make their present channels out of the basin. Before these channels were cut away the basin was filled with water, and probably connected with the ocean. The action of the waves and current in this inland lake on the worn-down schistoze rocks, has effected the mechanical liberation of the gold which has been deposited in the tertiary formation found resting on the schistoze rocks. These tertiary deposits seem to belong to two periods. Those which were first formed are directly on the older rocks, and were deposited when the basin was yet covered with the sea. The upper portions of these layers are sometimes composed of nearly pure fragments of quartz, firmly cemented together into a hard, compact rock. Where these quartz formations are found in depressions in the schistoze rocks, they are sometimes rich in gold.

The newer tertiaries were formed after volcanic action had raised the previously formed strata, and are made up from both the schistoze and older tertiary rocks. The effect of this volcanic action was to convert the basin into a series of lakes connected by rivers, which again acted upon the deposits on the sides of the basin, which had the effect of re-depositing the coarser materials at the mouth of these streams, while the finer matter was carried on toward the outlets. As the rocky barriers to these lakes were cut away, the deposits, which had formed in these beds, were again subjected to a re-distribution, which evidently had the effect of still further concentrating the gold which they contained, and it is now in the beds of these streams where the formation of the rocks has left natural bars that the gold thus brought down is found. The great beds which have not been disturbed by the river's action, contain, however, considerable amounts of gold, which can be removed by hydraulic processes on a large scale. From these drift deposits most of the gold yet to be extracted will probably come.

The most profitable river workings which are at present carried on, are in the Wakatipu District, and in the beds of the Molyneaux and Mannherikia Rivers. But little quartz mining has yet been undertaken, and that at Waipori. The yield of gold in the colony during the first year's extensive placer operation, was as follows :

	Ozs.
August 1, 1861, to August 1, 1862	457,239
" 1, 1862, to " 1, 1863	514,385
" 1, 1863, to " 1, 1864	497,031
" 1, 1864, to April 1, 1865	231,010

In addition to this there were 63,790 ounces from Otago.

The total amount of gold produced up to 1875, is 8,025,676 ounces, valued at $151,271,293. A gilded model representing this amount is shown in the New Zealand exhibits.

The display of gold nuggets, gold dust, and gold-bearing minerals made by New Zealand in the Main Building, is a particularly interesting one. One of the specimens contained in it, which belongs to Dr. HECTOR, Director of the New Zealand Geological Survey, consists of a thin section taken through an exceedingly rich, gold-bearing mass, which was found in the Caledonian Mine, in the Province of Auckland. It has a trapezoidal section, the width between the parallel sides being about two inches. The other two sides make, respectively, angles of 85° and 70°, with the parallel sides. The surface of the specimen, which is polished, shows that it is a nearly pure mass of gold, containing ramified veins of light and dark colored quartz. The parallel edges of the piece are made up of strips of quartz closely united with the gold, and about ¼ of an inch wide. Two fissures, which are about at right angles to the more oblique side, and which start from it, run part way across, without, however, entering the quartzose edge. The color of the gold is a light, brassy yellow, showing the presence of considerable silver, as alloy with the gold. This example of a nugget mass occurring *in situ* is such as is very rarely met with, but in the same mine from which it was obtained, similar specimens have been found, several of which are shown with this section. Three of these, as well as several others in the same collection, have been given to the Smithsonian Institution, where their formation can be critically examined and studied. These specimens were taken from a lode in the Caledonia Mine at a depth of 260 feet from the surface. The lode is made up of alternate bands of sandstone and quartz-carrying gold, and is five feet thick. A lode, parallel with this one, and which is in the same mine, yielded gold giving a profit of 585,000 pounds sterling in two years. The average alloy of silver with the gold is about 32 per cent. in this mine. Two specimens from the Union Beach Gold Mining Company's mines at Coromandel, which is on the west side of the peninsula lying to the east of the Firth of Thames, are very rich in gold. The rock carrying the gold is a whitish quarry rock, apparently somewhat decomposed, and much resembling ores found in the Comstock Lode. The gold occurs in thin foliated flakes throughout the mass of the rock, and is alloyed with considerable silver. It is estimated that the specimens shown contain 33 per cent. of gold. Some specimens from the Cune Mine, which adjoins the Caledonia Mine, are much like those already spoken of.

The gold fields of the southern portion of New Zealand, or South Island, are represented by a considerable number of specimens, both from quartz mines and alluvial workings.

These districts, which extend along the west coast of the island, from its northern extremity to about parallel of latitude 44, has heretofore been almost exclusively worked for the alluvial deposits, but now quite a number of companies are beginning to open up quartz mines. One of these mines, located on Rainy Creek, has a lode of paying quartz 30 feet thick, which extends a distance of 900 feet without narrowing. The explorations which have been made show that the gold is very evenly distributed through the whole mass. Several specimens are exhibited from the Enterprise Mine which do not show any visible gold. When crushed it yields about 4 ounces of gold to the ton. Fourteen mines in all, from these districts, are represented by specimens of gold-bearing quartz. The amount of gold which they carry are not generally large, ranging from 10 to 80 dwts. to the ton, but the lodes are generally wide, so that, with proper machinery, the working of the mines may become very profitable in the future. The alluvial gold workings from which a number of specimens are shown differ in some cases from any which have yet been described. There are workings along the sea coast which contain gold which has been deposited by wave and ocean current action. This gold is generally very fine and frequently mixed with iron sand. These deposits are worked in the ordinary manner by sluicing, and the specimens which were obtained in this manner, and which are exhibited with those just described, show the gold

to be generally quite pure. Some of the gold found in the streams is so fine and mixed with iron sand that it is necessary to separate it by means of mercury.

The Otago gold fields, which are situated at the southern extremity of South Island, are drained by streams running southward. The workings are almost wholly alluvial, as has been already stated, and are peculiar in yielding numbers of nuggets. A collection of some of these are placed with the other gold specimens. These nuggets weigh from one to eight ounces apiece, and are generally well rounded; some of them, however, containing pieces of imbedded quartz. Nearly all of these were obtained from sluicing operations on recent and tertiary gravel deposits. One specimen was obtained from cement gravels by stamping, and one other from cement which was disintegrated by washing. The fineness of the gold in all these nuggets is very high, averaging ·950, the small amount of alloying material being silver. The specimens of gold dust from the same district are similar to the nuggets as regards purity. One locality, called the Naseby Gold District, has iridium associated with the gold dust. The Bank of New Zealand have exhibited several models showing the weight and size of the ingots which they export. These range from 25 to 250 ounces each in weight. They also show some specimens of the milled gold and silver, such as they produce. One small bar from the Thames District, in the Province of Auckland, has the following composition:

Gold	·6565
Silver	·3390
Copper	·0045

Another bar from the Hokitika District, in Westland, assayed as follows:

Gold	·9627
Silver	·0363
Copper	·0010
Loss	·0012

One bar of refined gold, from which the silver was separated by the chlorine process, contains:

Gold	·9942
Silver	·0058

Bars of the reduced silver are also shown.

TO BE CONTINUED.

ON THE USE OF NATURAL GAS FOR PUDDLING AND HEATING AT LEECHBURG PENNSYLVANIA.*

By A. L. Holley, New York.

THE occurrence of this gas, in quite appreciable quantities, has been observed for many years in its escape along the creeks of Western Pennsylvania, and more recently, in much larger quantities, from the oil wells in and near Venango County. Within about five years several gas wells have been struck, from which the gas has escaped, continuously in prodigious quantities and at great pressure.

During the last year, a systematic attempt has been made to utilize the flow of gas from one of these wells, and results have been reached which were quite unexpected. This well, near Leechburg, Armstrong County, is about 20 miles north-east of Pittsburg, on one of the side tributaries of the Allegheny River. It had been drilled in search of oil to a depth of 1,250 feet in 1871, but none was found. A great flow of gas was developed, however, accompanied by a slight spray of salt water, and this has continued with little or no diminution to the present time. The gas in its escape has been discharged through a 5 inch pipe, and at a pressure of from 60 to 80 lb. per square inch, but no exact determinations, either of the pressure or quantity have been made.

The rolling mill of Messrs. ROGER & BURCHFIELD, is on the opposite side of the river, and it has been for some years devoted to the production of fine grades of sheet iron from charcoal pig metal, by puddling and in knobbling fires. The usual weekly product of the mill has been 30 tons of No. 30 tin plates, and 50 tons of No. 24 to 28 sheets.

The well was bought by this firm for $1,000, and the gas is led across the river, a distance of about 500 feet, through a 3-inch pipe. It is distributed through half-inch pipes, and at a pressure of about 45 lb. per square inch to several of the furnaces, but a large fraction of the total flow of gas is still wasted at the well.

No essential alteration in any of the furnaces has been found necessary in the use of the gas fuel, except to brick up the fire bridge and to put in the gas and air pipes. The old grate used for coal is loosely covered with bricks and cinder, so that a slight percolation of air may take place through them. The gas is admitted through a half-inch pipe, and blows toward the fire-bridge through 18 or 20 one-eighth inch jets. The air is blown in at about 2 lb. pressure, through two one and one-eighth inch jets obliquely down upon the center of the hearth, and a very perfect combustion is obtained.

A great improvement is effected in the quality of the product of the puddling furnaces by the combined action of the gas and air blast. The air is blown in during the melting, but it is then shut off until the boiling begins. It is then turned on full and a violent boiling action is maintained without any rabbling. It is thus found practicable to use one-half miscellaneous cast scrap iron, and one-half "Lucy" No. 3 coke pig metal in producing the best sheets for tin plate, a better quality being thus obtained than from charcoal pig metal as commonly puddled. Later observations, however, seem to indicate the probability of even more satisfactory results by the use, in connection with the gas flame, of a small auxiliary fire of coal.

The saving in either case in labor of firing is obviously almost total, for the flow of gas into the furnace is controlled by a simple gate, or valve. It is clear, too, that many other difficulties, experienced heretofore in the use of solid fuel, are almost wholly eliminated.

A material increase in the product of the mill is effected by the use of the gaseous fuel, the amount of sheet iron made in each 24 hours being about 13 tons, as against 10 tons in the older way, but with the use of the same furnaces and plant. The very important saving is also effected of from 60 to 70 tons of coal in the same time, the only cost whatever in the use of the gas being the small maintenance and interest charges upon the fixtures and upon the original cost of the well.

Ten heats can be made by the two turns between 3:30 A. M. and 7 P. M.,—about 1½ hours per heat—and this is a clear saving of one sixth in the time formerly occupied in the two turns' work. A common charge for each heat is 460 lb. "Lucy" pig metal, and 50 lb. to 80 lb. cinder from the rolls or the hammer. The yield in the bloom is from 480 lb. to 490 lb. for each heat. It has been found that 500 lb. of ore for fettling will last the 5 furnaces for a week with the gas fuel, while with coal in two turns and at one furnace 800 lb. has been required. The waste in the rolling, and all the later working of the sheets, is greatly in favor of the iron puddled in the gas furnace, as it is softer and more uniform in quality and texture.

The reduction in the cost of the blooms thus made, is very marked, those made from the scrap and pig metal mixture being credited to the gas furnace at $45 per ton, while the charcoal pig blooms, as puddled with coal, have cost $80.

The natural gas is thus far used in five furnaces for puddling, two for heating piles, three for annealing, and four for heating thin sheets, fourteen in all. In the pile heating furnaces a half inch pipe supplies gas enough to heat 8 or 10 tons of sheets per turn.

One new form of furnace has been designed for use with the gas fuel. This has no fire-box at all but the gas is blown down upon a shelf, like the ordinary bridge wall of a furnace, and it is thus spread out into a thin sheet. The air jets are directed down into and through this sheet of gas flame. Four or five air jets are also set so as to blow down into the hearth, and as many of these are used as may be needed.

The gas is also burned under 7 boilers, a sufficient supply for each being delivered through a one inch pipe. A layer of old bricks is roughly piled on the grate, and by the discharge of the gas beneath the boiler, through a hole in the front, a sufficient flow of air is induced, and a long and effective flame is maintained with an entire absence of smoke.

The lowest approximate estimate that has been made of the quantity of gas discharged by one of these large flowing wells, is 1,000,000 cubic feet per 24 hours. If, for the sake of making a comparative estimate, the amount of similar gas yielded by the coal of the same region be taken at 3 cubic feet per pound, then one of these wells would represent, in its flow of gas, a production of about 150 tons of coal per 24 hours.

From observations made subsequent to the reading of this paper, the following results have been gathered:

No. of Heat.	No. 1.	No. 2.	No. 3.	No. 4.
"Goabella" G. F. pig	312	294	265	241
Old car wheels	160	184	201	230
Total iron	472	478	466	471
Scales from rolls, etc.	275	302	260	260
Total charged	747	780	726	731
Product in blooms	553	556	540	572
Gain over iron charged	81	78	74	101
Percentage of gain	17	16	15	21

A recent analysis (1876) of the gas from this Leechburg well, by Mr. SADTLER, of the University of Pennsylvania, gives specific gravity, ·558:

Carbonic acid	·35
" oxide	·26
Illuminating hydrocarbons	·56
Hydrogen	4·79
Marsh gas $C H_4$	89·65
Ethyl hydride, $C_2 H^6$	4·39
	100·00

INFLUENCE OF COAL DUST IN COLLIERY EXPLOSIONS.

By W. Galloway.

WE have been furnished by the author with a pamphlet which contains a reprint of a valuable and interesting paper read before the Royal Society in the month of March of the present year. We present our readers with a few extracts. The author commences by saying that—"In coal mines in which the temperature of the workings is considerably higher than the mean annual temperature at the surface, there is usually a layer of rubbish on the floor of the roadways and airways, which consists, in some places, almost entirely of dry coal dust, and in others of coal dust mixed with small pieces of coal and stone. If it could be shown, therefore, that a mixture of air and coal dust is inflammable at ordinary pressure and temperature, there would be no difficulty in accounting for the extent and violence of many explosions which have occurred in mines in which no large accumulations of fire-damp were known to exist; for it is only necessary to suppose that a sudden gust of wind (originated, for example, by the explosion of a small accumulation of fire-damp) had swept through the adjoining galleries, raising a cloud of dust into the air, and then all the other phenomena would follow in regular order. The flame of the originally inflammable mixture would pass directly into the newly-formed one, expanding its volume; the disturbance would be propagated over an ever-widening area, until that area might possibly become co-extensive with the workings themselves; and the consequences would be the same as if the whole space had been filled with an inflammable mixture before the disturbance began. The accounts of colliery explosions published in this country hardly ever allude to the existence of coal dust; and when they do so, in one or two cases, it is for the purpose of suggesting that the gases disengaged from it by the heat of the fire-damp flame would, no doubt, be ignited, and tend to increase the force of the explosion. This seems all the more remarkable when it is remembered that a mixture of air with several other combustible solids in a finely divided state is explosive at ordinary pressure and temperature, and that some serious explosions have been caused by the accidental ignition of very fine dry flour suspended in the air in confined spaces. This subject has attracted more attention in France. In the first number of the "Annales des Mines," for the year 1875, there are some notes referring to it, together with a paper by M. VITAL, Ingénieur des Mines. M. VITAL describes, in a very minute manner, all the phenomena produced by an explosion in the Campagnac colliery on the 2d of November, 1874. A shot, which blew out the tamping, was fired in one of the working places, in a seam of bituminous coal, and was accompanied by an explosion which burnt three men so seriously that they died within a week. No fire-damp had been detected in this place at any time; but as the floor was covered with very fine, dry, coal dust, and as the shot was fired at the bottom of the face, and would consequently raise a cloud of dust, it was concluded that nothing but the instantaneous combustion of coal dust, under the influence of the shot, could account for the accident.

The writer then describes the nature of the coal dust, both in regard to the size of the particles and their chemical composition; and afterwards he gives an account of some experiments conducted by him in the Rodez laboratory,

* A paper read before the American Institute of Mining Engineers, at the Dover meeting, May, 1875.

for the purpose of ascertaining to what extent a flame resembling that of a shot is lengthened when suddenly lanced into an atmosphere consisting of air with fine coal dust suspended in it. In concluding, he says :—"Very fine coal dust is a cause of danger in dry working places in which shots are fired ; in well-ventilated workings it may of itself alone give rise to disasters ; in workings in which fire-damp exists it increases the chance of explosion ; and when an accident of this kind does occur, it aggravates the consequences." I had carefully thought over this subject for a considerable time before I had seen M. VITAL's paper, and had come to a conclusion somewhat different from his. It was this—that air mixed with certain proportions of fire-damp and dry coal dust would be explosive at ordinary pressure and temperature, although the presence of the same proportion of one of the combustible ingredients, or the other, alone, might be insufficient to confer this property on the mixture. I derived this opinion immediately from the consideration that, without doubt, combustible ingredients, or the other, alone, might be insufficient to confer this property on the mixture. I derived this opinion immediately from the consideration that, without doubt, combustible gases can supplant each other in certain equivalent proportions in mixtures which will just ignite at given temperatures, and that finely divided combustible solids have probably the same property to some extent. Accordingly, when an opportunity occurred on the 3d of July last, I made experiments to test the correctness of these views."

The author then gives a description of the apparatus, illustrated with a wood engraving, and says further, "That fine coal dust, with which the whole air current was charged, passed over the naked flame, which seemed to lengthen somewhat under these circumstances ; but on no occasion did the mixture take fire, or show any symptoms which led me to suppose it might possibly do so. I repeated this experiment many times, both with steam-coal dust and with the finest and driest dust of the No. 3 Rhondda seam, which is an excellent coking coal, and invariably obtained the same result. The air was charged at different times with every proportion of dust, from a thin, scarcely visible cloud, to one which extinguished the flame of the lamp. The following analyses of the two kinds of coal-dust employed in these experiments have been kindly made by Dr. FRANKLAND :—

	Steam coa dust.	Bituminous coal dust.
Carbon	85·295	82·570
Hydrogen	5·040	5·400
Oxygen (by difference)	1·261	6·030
Nitrogen	·668	1·050
Sulphur	·692	·800
Moisture	·614	·670
Ash	6·490	3·480
	100·000	100·000

In some of the experiments with coal dust and air alone, the dust of the bituminous coal was carefully dried and sifted through muslin before being used. The results of these experiments, and of others which I have made since, seem to indicate very conclusively that a mixture of air and coal dust is not inflammable at ordinary pressure and temperature. When, however, a small quantity of fire-damp was allowed to pass into the apparatus with an air current, the mixture of air, fire-damp, and coal dust was found to be somewhat explosive."

The author then details the mode of experiment, and proceeds to say :—"I have extracted the following analysis of the fire-damp employed in this and all other experiments that follow from a paper by Mr. J. W. THOMAS, 'On the Gases inclosed in Coals from the South Wales Basin, and the Gas evolved from Blowers and by Boring into the Coal itself,' printed in the *Journal of the Chemical Society*, September, 1874. The composition in 100 parts was :—Marsh gas 94·78 ; hydride of ethyl, 0·90 ; carbonic anhydride, 0·72 ; nitrogen, 3·60= 100 00. On the 4th December last a serious explosion occurred in New Tredegar Colliery, and on the 6th two others followed, in Swaithe and Llan Collieries. I made an official investigation into the circumstances attending the explosion in the last-mentioned colliery, and was fortunate enough to be able to visit the workings within two-and-a-half hours after its occurrence, when the ventilation was only partially restored. At that time the air in all the unventilated parts of the workings near the level in which the explosion had taken place (as far as they could be explored with safety) was so charged with coal smoke, soot, and other products of the imperfect combustion of coal, that it was difficult to distinguish objects two or three feet distant. During this and subsequent visits to these workings, I ascertained that the floor of the level already referred to was covered with a layer of dry coal dust, mixed with small pieces of coal and stone, throughout its entire length (130 yards) ; that for about fifty yards next its inner end the ventilation of the level itself, and of the working places branching from it, dependent almost, if not altogether, on a convection current and diffusion ; and that fire-damp was given off occasionally by the coal and strata at the face of the level, and in two other places fifty or sixty yards further out, in sufficient quantity to form small explosive accumulations. It was asserted, moreover, that no accumulation of explosive gas was known to exist anywhere in, or near, this part of the workings an hour before the accident ; and as there were naked lights in each of the working places, an explosive accumulation which might be formed in one of them could not find its way into any of the others without passing one of these lights and being ignited by it. It was impossible, therefore, that a large accumulation of gas could have been formed within the hour which preceded the explosion. On the other hand, there were traces of coked coal dust on the timbers, extending over a distance of 322 yards of the workings, pointing to the presence of a large body of inflammable matter ; and yet the amount of damage done was insignificant. The traces on the props undoubtedly indicated the direction in which the air was traveling when the coked coal dust was deposited ; and I could not satisfactorily reconcile the various directions indicated in this way, except on the supposition that the inner end of the level had been the origin of the explosion ; that in the level itself, and in the two places branching from it to the dip (the only branches in which the traces were distinct), the coke was deposited during the *retrograde* movement of the air ; and that in the places leaning from the outer end of the level it was deposited during its *outward* movement. Every circumstance tended to show that some explosive gas had accumulated at the inner end of the level, where there was no ventilating current ; that this gas had ignited at one of the naked lights, raising a cloud of dust along the level by its explosion, and that there had been sufficient fire-damp in the air occupying the level, to form a weak explosive mixture, when the coal dust was added. There could be no doubt whatever, that the whole of the air in the level contained *some* fire-damp, so that it became a matter of importance to ascertain the smallest quantity required to make air explosive when coal dust is added ; and with this object in view I made further experiments on the 13th December." The author then gives an account of his experiments, and proceeds :—

"To recapitulate in a summary manner what has been already said in the preceding pages of this paper, we have now two principal facts before us, which are these :—1. A mixture of fire-damp and air, in the proportion of one volume of the former to sixty, or more, volumes of the latter, gives no reliable indication of the presence of the inflammable gas, when tested in the manner usually, if not always, adopted in mines. 2. A mixture of fire-damp and air, in the proportion of one volume of the former to 112 of the latter, becomes inflammable at ordinary pressure and temperature, when charged with fine dry coal dust, such as that which is to be found on the roadways in dry coal mines. It seems, therefore, only reasonable to conclude that an explosion, originated in any way whatever, in a mine of this class, may extend itself to remote parts of the workings where the presence of fire-damp was quite unsuspected.

The following remarks are specially valuable :—"Before leaving this part of the subject, it may not be out of place to make a few remarks on the influence of blasting shots in giving rise to explosions in mines. I have already had the honor of submitting a paper on the same subject to this society, published in No. 154 of the 'Proceedings of the Royal Society' for 1874. In that paper, experiments were described which showed that an intense sound-wave, such as that originated by a blown-out shot, was able to pass the flame through the wire gauze of a safety lamp burning in an explosive mixture. The two hypotheses advanced in the reports of the inspectors of mines to account for the simultaneousness of explosions of fire-damp with the firing of shots were also mentioned ; and I purpose again to refer to one of these, namely, that which supposes the fire-damp to be ignited directly by the flame of the shot. There can be no doubt that the gases which issue from a shot-hole have a sufficiently high temperature to ignite an explosive mixture of fire-damp and air if they pass into it immediately. I exploded such a mixture of coal-gas and air many times by firing a pistol shot into it when making experiments at the Meteorological Office in the beginning of the year 1873. It seems exceedingly doubtful, however, whether the gases even from a heavily-charged shot which blows out the tamping will retain a sufficiently high temperature to ignite a mixture of this kind at a distance of a few yards, if they have to pass through a space filled with pure air before reaching it. On the other hand, it may be reasonably supposed that if the same shot were fired in various mixtures of fire-damp and air its flame would be prolonged more and more as these mixtures drew nearer to the explosive point, somewhat in the same measure as the cap on the flame of a lamp enlarges under the same circumstances. This prolonged flame might even partake of the nature of a local explosion of fire-damp, especially if augmented by the presence of a small quantity of coal dust, although those who fired the shot had not been able to discover the existence of any explosive gas beforehand. I undertook to investigate the nature of mixtures of gas and air which are not explosive at ordinary pressure and temperature, when I applied to the Government Grant Committee for assistance, in 1872 ; but I regret to have to say that, from various causes, I have not yet been able to carry out the necessary experiments. M. VITAL has given experimental results which tend to show that the flame of a shot is prolonged in a mixture of coal dust and air. I have repeated his experiments with gunpowder, but without much success, having only once succeeded in getting the flame to appear at the end of the apparatus, when the shot was fired from a pistol ; and as the mixture of coal dust and air was traveling in the same direction at the rate of about 500 feet per minute, some deduction must be made on that account. The charge consisted of 1·365 gramme of gunpowder well rammed. I also placed a shield, and fired many shots through a hole in the center into the current charged with coal dust ; the amount of gunpowder varied from 2½ grammes downwards, but on no occasion did the mixture seem to ignite. It is always possible, however, that if coal dust could be made fine enough, and were thoroughly mixed with dry air in the proportion of about 1 lb. to 160 cubic feet of air, the mixture might be inflammable at ordinary temperature, or, if not, it might at least be so nearly inflammable that an explosion begun in it in a confined space might be propagated through it. Without some further proofs, therefore, it would be premature to draw any positive inference from my experiments with gunpowder shots, as they are by no means so satisfactory as I could wish ; and I am glad to be able to state that Professor MARRECO, of Newcastle-on-Tyne, intends to investigate this question with more substantial apparatus. The occurrence of three great explosions within as many days in the beginning of December last, seemed to indicate the influence of some external agency tending to produce the same result in each individual case. The barometer was high and the temperature at the surface exceptionally low at the time, and it is well known that these atmospheric conditions are not favorable to the occurrence of explosions in which fire-damp is alone concerned. It had been often observed before that disastrous explosions happen most frequently during the Winter months, and in some instances, during very cold weather. Mr. SCOTT has recently informed me that he pointed out the latter circumstance in the year 1867, in an official letter to the Home Office ; and in preparing the diagrams for our papers on the connection between colliery explosions and weather, it was remarked by both Mr. SCOTT and myself that several great explosions had occurred in the years with which we had to deal (1868 and 1872 inclusive) during weather very similar to that which prevailed in the beginning of December last. This phenomenon was more marked, however, on the last occasion than at any time during my own experience ; and while I was investigating the causes of the Llan explosion the following explanation presented itself to me, which I have now the honor of submitting to the consideration of the fellows of this society, with the remark that this part of the subject will be more minutely investigated by Mr. SCOTT and myself. It we assume that the magnitude of some colliery explosions has been determined by the presence of coal dust in the workings, and that the hygrometric state of coal dust changes with the humidity of the air with which it is in contact, then it is an obvious conclusion that explosions of this kind will be most likely to occur when the air in the mines is driest ; for at such times not only will the coal dust be most easily raised into the air by the local explosion (which we may always suppose to happen at any rate), but it will also be burned more easily than when it contains a larger proportion of moisture. As an example, we may take the case of a dry mine, in which the temperature of the workings is 70° Fahr. During warm weather, the air which descends the shaft has a temperature of, say, 60° when it enters the intake air-course ; at this stage it is also saturated with vapor, for there is usually a little trickling down the sides of a main shaft. The temperature rises gradually as the current draws nearer to the faces, and at length attains its maximum when the newly-exposed face of the coal has been passed. During this process, the humidity has also been increasing to some extent, always remaining below complete saturation, however, in a mine of this kind. In very cold weather, on the other hand, the same current may sometimes have a temperature of 32° or less, when it

reaches the bottom of the shaft; and since it passes through the same workings, its temperature rises to 70° as before. It is plain, therefore, that, in the latter case, the ventilating current must either obtain an additional supply of moisture from the workings (about ½ lb. for every 1,000 cubic feet of air), or it must be drier than in the former case at every point of its course. *Primâ facie*, then, this process of reasoning leads us to the conclusion that explosions whose magnitude is due to the influence of coal dust will happen most frequently during cold weather; and conversely, we might expect to find that the magnitude of those explosions which occur during cold weather is traceable, in some measure, to the influence of coal dust. It may be said, in conclusion, that the dangers arising from the presence of dry coal dust in many mines may be greatly diminished by having the coal dust itself removed as far as possible, and extending the system of watering the roadways, now practiced in many places for the sake of comfort. The same precautions are recommended in M. VITAL'S paper already referred to. It should also be mentioned in this place that the ventilation of many mines will require to be largely augmented before we can reasonably expect to enjoy comparative immunity from the recurrence of explosions.—London *Mining World*.

PROJECT FOR THE ERECTION OF BLAST FURNACES IN NEW JERSEY.

By William Kent, M.E.

(*Continued from page* 169.)

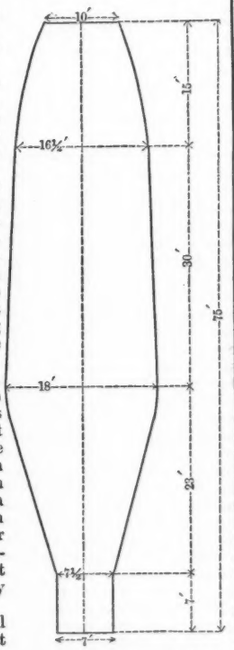
As examples of furnaces which may be considered types of the most advanced and best forms, may be mentioned the two new furnaces at Bethlehem, Pa., 70 feet high by 17 feet 2 inches width of bosh, one at Secaucus, N. J., 65×17 feet, one at Orbisonia, Pa., and one at Harrisburg, Pa., of the same size, and one at Durham, Pa., 76×19 feet.

The accompanying sketch shows the shape and size of the interior of one of the proposed furnaces. The shape is not exactly like that of either of the above named, but the difference is not great. The size is 75 feet high by 18 feet width of bosh, this being considered a fair average of the largest anthracite furnaces. Larger ones have been built, such as the Stanhope, N. J, 80×20, and the Durham, 76×19 feet, but it has not yet been shown that these give any economy of production over the size proposed, sufficient to compensate for their increased first cost.

The ratio of height to width of bosh is about that of the average. The furnace at Franklin, N. J., has a height of 67 feet, and a bosh of 23, but this ratio is not generally believed to be a good one.

The size and shape of the hearth is nearly the same as those of the furnaces above mentioned, and the width of the mouth is about the average in furnaces of like dimensions. The furnace at Durham has a width of mouth of 16 feet, but this is exceptionally large.

The stack is to be cased with boiler iron, double cap riveted in vertical joints and single riveted in horizontal joints. This, with the red brick inside-casing, rests on a heavy cast iron mantel, supported by six hollow cast iron pillars. The lining is to be of the best furnace blocks from Perth Amboy, or Woodbridge, N. J., and is 48 inches thick at the bottom, diminishing to 28 inches at the top. The space between the fire-brick lining and the red brick is to be filled with sand, refuse pieces of brick, etc.



SHAPE OF INTERIOR OF FURNACE

In the hearth are five embrasures for tuyeres, and one for a cinder tap. The front is closed by a Lürmann's patent closed front, and Lürmann's bronze cinder tap is used. The cinder tap is at one side of the hearth, and not in the immediate front, as in some furnaces. The former position is recommended by the patentee, and is that which is used at the Durham furnace. The Lürmann closed front has been used only a few years in this country, but has given satisfaction wherever tried. The royalty on the use of the patent is considerable, $100 for each foot of width of bosh at each furnace, but even at this price it will not pay to be without it.

The top of the furnace is closed by a double bell and hopper, which is a considerable improvement over the ordinary bell and hopper, as it allows of a better distribution of the charge. The cup and cone are both fixed, a large space being left between them which is closed by a movable annular cone, or ring. This arrangement was first designed by MR. S. SJÖBERG in 1867, and used by him at Bingen, Pa., in 1871. It has been adopted at some other furnaces, among which are Parryville and Glendon, Pa., and a modification of it is in use at Durham. The apparatus is operated by THOMAS'S patent air lift, which consists of a simple air cylinder and piston, the air being supplied by a pipe from the blast receiver.

Leaving, for the time being, the description of the other parts of the furnace and its appurtenances, we proceed to the calculations of the supposed working of the furnace.

Production.—From the drawing, the capacity is found to be 12,900 cubic feet. A furnace of this size should produce not less than 300 tons per week, using 50 per cent. ores, and running, as do the Lehigh Valley furnaces, with blast 8 pounds pressure above the atmosphere, and a temperature of 1,000° F. The Durham furnace has made as high as 50 tons per day.

With richer ores the production might reach 350 tons per week, but 300 tons will be assumed as the basis of the following calculations.

Ore mixture.—The following is an estimate of an average analysis of a mixture of ores which might be advantageously used at the furnaces. It is assumed that one-half of the supply is obtained from Ringwood, one quarter from Green Pond, and one quarter from Staten Island. The analyses of these have been already given. The Ringwood ore is supposed to be one-half from the Cannon Mine, an average of Nos. 1, 3, and 4, and one-half from the Old Hope Mine. The excess over 100 in the analyses is deducted from the sesquioxide of iron, and the loss in analysis of the Green Pond ore is added to the silica.

AVERAGE ANALYSIS NO. 1.

Metallic iron	59.22	Alumina	2·33
Oxygen with iron	24 42	Silica	8·64
Phosphoric acid P = 27 / O = 34	·61	Sulphur	·70
Titanic acid	·40	Moisture	2·23
Lime	1·14	Oxide of manganese	·08
Magnesia	·23		100·00

Fuel.—In a paper on the Comparative Value of Iron Ores, by E. S. MOFFAT, Manager of the Port Oram Ironworks, New Jersey, published in the *Bulletin of the Iron and Steel Association*, December 24, 1875, a statement of the amount of coal necessary to smelt ores of different percentages of iron is given, as shown by the experience of the Port Oram furnace.

As this furnace uses ore, limestone, and fuel which are very similar to those which will be used by the proposed furnaces, the figures there given will be assumed to be applicable to the present case. These are, for 60 per cent. ores, 1·3 tons of coal per ton of iron; for 55 per cent. ores, 1·425 tons; for 50 per cent. ores, 1·55 tons; for 45 per cent. ores, 1·675 tons; and for 40 per cent. ores, 1·80 tons.

A paper by T. F. WITHERBEE, Manager of Port Henry Furnace, N. Y.,* shows that these figures have even been improved upon. The latter furnace uses Lake Champlain ores exclusively. The figures for four months' working are:

1st month	...ores	54·4	per cent. coal	1·4	tons per ton of pig iron.		
2d "		59·2	" "	1·3	" "	"	
3d "		55·6	" "	1·3	" "	"	
4th "		54·8	" "	1·27	" "	"	

The use of the Whitwell hot-blast ovens at this furnace may, perhaps, account for this economy.

For the proposed furnace a consumption of 1·3 tons of coal per ton of iron is assumed, when the ores are of the average composition above given, containing 59·22 per cent. of metallic iron. The coal is assumed to be the same as that used at Port Oram furnace, the analysis of which, according to the paper by Mr. MOFFAT, is as follows:

ANTHRACITE COAL.

Carbon	91·50
Volatile matter, sulphur, etc	1·50
Silica	3·04
Alumina and sesquioxide of iron	3·10
Lime	0·86
	100·00

Flux.—The limestone is assumed to be that used by the Boonton Iron Co., from Turkey Mountain, near Montville, the analysis of which has been given.

The quantity of limestone required will be that which is necessary for the formation, with the impurities contained in the ore and coal, of a basic slag containing from 38 to 40 per cent. of silica, and approximating to the formula (in the old chemical notation) R_2O_3, $SiO_3 + 2$ (3 RO, SiO_3).

A rapid method of finding the approximate amount required, is to calculate from the analyses of the coal and ore the amounts of the non-volatile, slag-forming constituents. The silica found in this calculation may be assumed to be 38 to 40 per cent. of the total weight of slag required, as the limestone contains but little silica. Limestone is now to be added in such amount that the sum of its non-volatile constituents makes up the difference between the total weight of the slag and that part of it which is derived from the ore and coal. The computation is then checked by adding together the slag-forming elements derived from the coal, from the ore, and from the calculated amount of limestone, and finding the percentage of each element in the slag thus formed. If the resulting analysis is not satisfactory, it may be made so by varying the amount of limestone and repeating the calculation. It may sometimes be shown by this calculation that the slag contains an excess or deficiency of some one element, such as alumina, which no change in the quantity of limestone can remedy. In such cases it indicates that another mixture of ores or a different quality of limestone is required.

A calculation like that above described shows that in the present case about 30 pounds of limestone are required for each 100 pounds of iron.

The following balance-sheet shows the distribution of the stock for each 100 pounds of pig iron produced.

DISTRIBUTION OF THE SOLID MATERIALS OF THE CHARGES—NO. 1.

Charge.			Iron.	Slag.	Gas.
Ore 160 lb.	Fe	94·75	94·75	.....	.....
	O	39·62	·43	.....	39·62
	P	·43	.....	.....	.....
	Ti_2O_2	·64	.....	·64	.....
	CaO	1·83	.....	1·83	.....
	MgO	·37	.....	·37	.....
	Al_2O_3	3·73	.....	3·73	.....
	SiO_2	13·83	.....	13·83	.....
	S	1·12	.....	.....	1·12
	Moisture	3·57	.....	.....	3·57
	MnO	·11	.....	·11	.....
Coal 130 lb.	C	118·95	4·15	.....	114·80
	SiO_2	3·95	.....	3·95	.....
	Al_2O_3	3·02	.....	3·02	.....
	Fe_2O_3	1·01	.....	0·91 FeO	·10 (O)
	CaO	1·12	.....	1·12	.....
	Vol. Mat. & S.	1·95	.....	.....	1·95
Limestone 29.64 lb.	CaO	9·12	.....	9·12	.....
	MgO	5·79	.....	5·79	.....
	CO_2	12·78	.....	.....	3·49 (C) / 9·29 (O)
	Al_2O_3	·24	.....	·24	.....
	SiO_2	1·44	·67 (Si)	.....	·77 (O)
	Water	·27	.....	.....	·27
Total		319·64	100·00	44·66	174·98

* Read before the American Institute of Mining Engineers, February, 1876. Published in ENGINEERING AND MINING JOURNAL, Vol. XXI., p. 297.

From the above figures the composition of the slag is found to be

Silica	39·81
Lime	27·03
Magnesia	13·79
Alumina	15·65
Protoxide of iron	2·04
Protoxide of manganese	·25
Titanic acid	1·43
	100·00

Furnace Gases.—The total amount of carbon in the gases is 114·80+3·49= 118.29 pounds for each 100 pounds of pig iron. The amount of air blown into the furnace may be found from the weight of the carbon in the gases, provided we know their analysis. The following table gives the analyses of the gases at several furnaces:

COMPOSITION OF FURNACE GASES (BY WEIGHT).

	I.	II.	III.	IV.	V.	VI.
Carbon	16·61	17·19	16·46	14·90	16·49	16·09
Oxygen	24·53*	23·52	24·86	26·54	26·52	27·12
Nitrogen	57·35	56·93	55·45	55·56	52·89	52·42
Hydrogen, water, and volatile matter	1·51†	2·36	3·23	3·00	4·09	4·37
	100·00	100·00	100·00	100·00	100·00	100·00

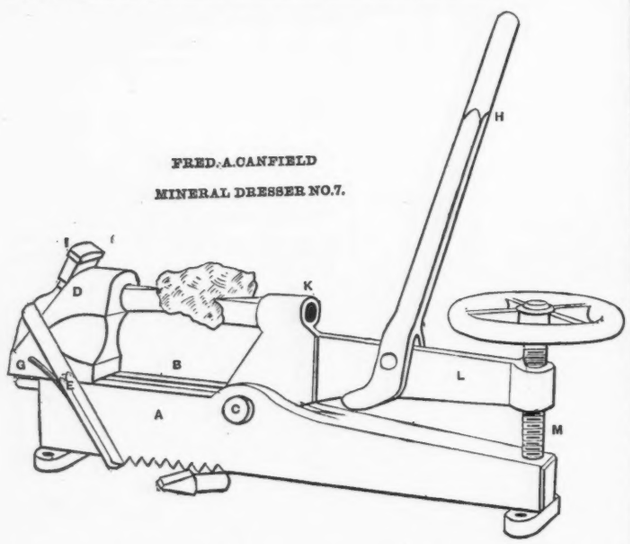
* Including oxygen in the moisture. † Hydrogen only.

TO BE CONTINUED.

CANFIELD'S MINERAL DRESSER.*

By T. Egleston, Ph. D., Columbia School of Mines, New York.

AT the Dover meeting of the Institute, Mr. F. A. CANFIELD showed some of the members a machine which he had invented for dressing mineralogical and geological specimens, which he has since modified and brought to such a high state of perfection, that after having used it for several months in preparing specimens for the cabinet of the School of Mines, I have thought it well worth the attention of the Institute, as it is destined to render important service in the preparation of specimens of minerals and fossils for exhibition.



The machine is composed of a cast-iron bed-plate A, which is nearly square at one end, and slightly inclined at the other, and is fitted with projections which are pieces with holes to receive screws for fastening it. The surface B is planed and slotted with a V groove to receive a sliding cast-iron head D, which is held in the position to which it has been adjusted by means of a wrought-iron clamp E, which fits into a series of notches in the underside of the bed-plate. In the back of the head it fits into a semi-circular slot, made in projections on both sides of the head. It is kept in position by a brass spring G, and when once adjusted is held firmly in position by means of the steel wedge I, which is driven in so as to force the clamp up against the bottom of the bed-plate. The head D is provided with a slightly tapering hole to receive the tempered steel chisels, of whatever shapes, that are to be used in dressing. Opposite the sliding head there is another head of wrought iron, which has a long arm L attached to it. This head rotates on a pivot C, which runs through the bed-plate, and is fastened with a nut on the opposite side. The end of the long arm is enlarged to receive the steel screw M, which raises the arm or lowers it, according to circumstances. This head also has a conical hole for the reception of various kinds of chisels which are to be used. The end of the chisel in the head K is almost directly over the axis of rotation C, so that any short movement of the screw M will cause it to move in a nearly horizontal direction. To use the instrument, the screw is run up so that the long arm of the head K almost touches the bed-plate; the wedge is taken out, the hand is pressed upon the lower part of the clamp E, so as to free the head D. The specimen is then placed between the two chisels, and the head D shoved up against the specimen to the exact point where it is intended to cut. When the chisels are in contact with the stone, the wedge I is replaced and driven up; the screw M is then slowly turned by means of the wheel. A few turns of the screw will cut off the hardest rock very nearly square. The length of the cutting surfaces of the chisels may be made to suit the work to be done; they are usually about an inch and a quarter long.

The action of the pressure is such that when the separation of the rock takes place there is very little jar. The rock is simply cut at the point where the chisel acts, and almost the whole force of the machine acts between the two chisels, so that there is no danger of the specimen becoming deteriorated from the jar. I have, in this way, frequently cut the hardest rocks, both sides of which were covered with delicate crystals, without any damage to the crystals, in fact, without disturbing any of them in their position.

The motion of the screw is so slow that the action of the chisels is like t of a very powerful shears. The chisels can be turned at any angle which m be necessary to suit the form of the specimen, or may be made in any sha ks to suit the different kinds of work it is required to do. For dressing soft roc and slates, where a quick sharp action is required. a lever O is adapted to the wrought-iron arm L, which may be easily removed when it is not required; to use it, the screw is turned up so as to allow the arm to drop upon the bed-plate. The heads are then adjusted as before, and while the specimen is held in the hand, the chisels are made to act by a series of short quick movements of the lever. This adjustment is of special use for trimming shales or soft rocks containing fossils, and is so effective that there is no danger of breaking the specimen which it is desired to trim. Every collector of minerals will appreciate the value of such a machine, for the most skillful adept in the use of hammer and chisels is often compelled to keep a cumbersome specimen in his cabinet, or run the risk, when the mineral has an easy cleavage or adheres slightly to the rock, of destroying it, for the stroke of the hammer, no matter with how great skill it is directed, will often exert its power, not upon the rock, but upon the crystal, which it will detach or cleave, after which there is no repair. The power which is exerted is very great, more than sufficient to trim into shape any specimen which would be required in a mineralogical, geological, or palæontological cabinet.

Since the introduction of this machine into the mineralogical laboratory of the School of Mines, we have had very little use for hammers and chisels, and the attempt to dress an unwieldy specimen has not once resulted in disappointment.

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

CONVERSAZIONE OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

Special Report of the Engineering and Mining Journal.

COPPER DEPOSITS OF AMERICA.

AT the regular weekly conversazione, held in the rooms of the Centennial Committee of the American Institute of Mining Engineers, on the evening of Aug. 31st, Dr. T. STERRY HUNT, made some remarks on the copper deposits of America, and particularly of those of Lake Superior. He noticed the early history of the attempts to work the native copper of that region, and the doubts which were at first entertained, as to the value and the probable permanence of mines so unlike any others known. The formation consists of sandstone, and conglomerate with great masses of interstratified eruptive rocks and volcanic tufas, the whole forming a series many thousand feet in thickness, to which the name of the Keweenaw group has been given. From the many resemblances between this and the mesozoic sandstone with eruptive traps that occur on the Atlantic slope of the Appalachians, the copper-bearing series of Lake Superior was also referred to the mesozoic period, but the late researches of PUMPELLY have confirmed the views of LOGAN and WHITNEY, who assigned it a position at the base of the palæozoic column. It rests on the crystalline rocks of Huronian age, and is unconformably overlaid by sandstones which are considered to be lower than the Trenton limestone. The copper occurs in these rocks in great fissures traversing the strata, from which masses of the metal, of many tons in weight, are sometimes extracted; but a more abundant and more constant source of the metal is found in the finely disseminated copper which occurs scattered through certain beds of volcanic tufas and sandstones, sometimes, as in the Boston and Albany, and Calumet and Hecla Mines, forming the cement of quartziferous porphyries.

Dr. HUNT then gave some account of the mode of mining these deposits, and explained that by careful mechanical treatment, rocks yielding not more than one per cent. of metallic coppers, can be exploited with advantage. He described the immense yield of copper from the Calumet and Hecla Mine, which furnishes annually about 10,000 tons of ingot copper, the whole product of the region being about 18,000 tons. As regards the theory of the origin of metallic coppers, he gave reasons for regarding them of aqueous and not of igneous origin, that the source of the copper was to be sought in the old crystalline rocks of Huronian age. These contain, in many places, large amounts of sulphuretted ores, from the oxidation of which soluble copper salts are formed. The chemical processes probably depended on the intervention of organic matter aided by volcanic heat, which caused the precipitation of metallic copper, and the association with it of metallic silver. Allusion was made to the wide dissemination of copper in the mesozoic rocks of the Atlantic slope, from Nova Scotia to Virginia. These also rest upon old crystralline schists containing pyritous copper ores, from which, as in the case of the Lake Superior rocks, the copper was probably derived. In some few cases, copper is found with these mesozoic rocks in a metallic state.

These deposits are seldom very rich, but are in some cases mined and smelted with advantage. The large deposits of cupriferous pyrites, generally of low grade in the crystalline rocks of the Appalachians, in various localities from Canada to Alabama, are like the pyritous ores of Spain and Portugal, valuable also as ores of sulphur. They are smelted in Vermont and Tennessee, but the cost of working low grade ores, in regions where mineral fuel is not easily accessible, is so great as to render humid processes more economical. Dr. HUNT terminated his remarks by a brief descr ption of the HUNT & DOUGLAS humid process now used at Ore Knob, in North Carolina, and at Phœnixville, Pa., for the extraction of copper.

GEOLOGY OF INDIANA.

At the weekly meeting, held on the evening of September 7, Professor E. T. COX, of Indiana, made some remarks on the economic geology of that State, in which he spoke of the large sandstone and flagstone quarries which are worked at various localities. He also gave a resumé of the characteristics of the block, caking, and cannel coals which are found in the State. The fact of the increased yield of coke from coal when coked under a layer of sand, or simply under the pressure of its own gases was also spoken of by Prof. COX.

NOTES.

UTAH BASE BULLION PRODUCT.—We note the statement that the smelting works of Utah Territory have produced 26,000,000 pounds of base bullion since the 1st of last February.

NEW SOUTH WALES GOLD DISCOVERY.—A narrow ridge of gold quartz, thirty miles long, has recently been discovered in New South Wales. It is reported to contain an enormous percentage of gold.

SALE OF THE EMMA SILVER MINE.—This mine was sold at Salt Lake City, on the 8th inst., to a person representing TRENOR W. PARK, for $144,194 24, to satisfy a judgment obtained by PARK and the New York Loan and Indemnity Company.

ARRANGEMENTS were being made to start the old Baltimore Tunnel, Wilkes-Barre, to-day (Sept. 13), but the scarcity of cars compelled the order to be countermanded. The miners acquiesced in the reduction, with the hope of steady work coming.—Scranton *Republican*.

SOUTHERN BLAST FURNACES.—The South has now more blast furnaces in blast, in proportion to number than the North, and the former are nearly all making money, "while constant loss at the North is the rule." The Roane Iron Company's mill, at Chattanooga, was the only mill in the United States, running exclusively on railroad iron, which declared a legitimate dividend last year.—Chattanooga (Tenn.) *Times*.

NEARLY 500 boats loaded with coal are now lying at Rondout awaiting market. This makes boats so scarce at Honesdale that no coal will be shipped over the Delaware and Hudson gravity road to-day (Sept. 13), from a single colliery. The scarcity of boats and water and the dull market for anthracite, has induced the company to let No. 2 shaft, Olyphant, to fill up with mine water for the present.—Scranton *Republican*.

LEHIGH COAL AND NAVIGATION COMPANY.—*Financial Editor of the Public Ledger:* Having a small interest in the stock of the Lehigh Coal and Navigation Company, I have made some examinations of its late reports and of the leases of the New Jersey Central Railroad Company, and the information so obtained may be of value to some of your readers. According to the balance sheet of January 1st, 1876, the capital stock amounted to..... $10,248,550
Indebtedness..... $16,138,006
Deduct the amount assumed by Central Railroad of New Jersey and Lehigh and Wilkes-Barre Coal Company 3,604,000
$12,534,006

Total stock and debt..... $22,782,556

At a re-valuation made in 1871 the assets were estimated at $26,019,934, which would make the stock worth over par. The test of value, however, is the amount of the net earnings. This was made up in 1875 as follows:

Revenue from railroads	$1,059,548
Revenue from Nesquehoning tunnel tolls	18,702
Revenue from canal	200,000
Revenue from coal lands	500,000
Net profit on real estate sold	9,889
Miscellaneous receipts	60,935
Total	$1,849,085

The rent from the railroad is one-third of the gross earnings, and as the road is laid with steel rails the cost of maintenance is light and the operating expenses should not exceed sixty per cent. Those of the Lehigh Valley Railroad for 1875 were less than 54 per cent. The rental in 1873 was $1,174,081, and in 1874 was $1,128,433. The rent from the canal is a fixed sum and not excessive. The rent from the coal lands is not to be less than $500,000 a year, but if the royalty, calculated at 21 per cent. on the price of coal at Mauch Chunk is less, the difference is carried forward as a credit on future payments, but in 1877 a minimum of 900,000 tons must be paid for, and in 1878 and thereafter one million tons must be paid for. In 1875 the rental of $500,000 was $274,374 in excess of the royalty, but the profit on operating the railroad should have been nearly as much, while the incidental advantage of getting the tonnage must more than make up the apparent loss on the rental. Should a receiver, therefore, be appointed for the New Jersey Central Railroad Company, of which there seems now to be no likelihood, it would be his duty as an officer of the court to protect his trust by continuing to make the payments stipulated in these leases, and there is no probability of any considerable falling off in the rentals, whatever may be the depression in the coal trade, and the general expenses and interest account have been greatly reduced since 1873. A bargain may very well be profitable to both sides, and "good bargains" usually are so, and while these leases were judiciously made on the part of the managers of the Lehigh Company, they are still more essential to the interests of the Central Railroad Company, not merely because the business so secured is indispensable, but because it is necessary to have a line of communication to the coal lands of the New Jersey Company in the Wyoming region. No disaster, therefore, that may befall that corporation can more than temporarily affect the Lehigh Company, and in case the leases could be cancelled it might now be desirable to have it done. The Morris and Essex, the Belvidere and Delaware, and the Easton and Amboy are all at hand to carry the coal to tidewater, and whereas these leases were negotiated at a time when the Lehigh Company was more or less embarrassed, a fact which reflects the greater credit on the officers by whom they were negotiated, at the date of its last annual report it had no floating debt that possessed unencumbered real estate worth $700,000, and personal property equal to $350,000. It should be able, therefore, if necessary, to resume the management of its own property and to earn a revenue equal to that payable under its leases. I am, etc., D.

MINING NOTES FROM COLORADO, MONTANA, NEVADA, AND UTAH.

COLORADO.—*The Centennial Gold and Silver Mine* is located in Geneva District, in Clear Creek County. It has been opened by a tunnel run on a cross vein—the Little Casino—a distance of two hundred feet, at a depth of about one hundred and twenty feet from the surface. At the point of intersection, they have a vein of ore ten inches in width, which runs about two hundred ounces silver per ton, with considerable gold. The ore is galena, with an intermixture of gray copper, and considerable copper pyrites—the latter carrying the gold.

The Diamond Tunnel.—This enterprise is now in over 1,100 feet, and within from 100 to 140 feet of the Dives Lode. It is now being worked night and day, with a full force. The breast of the tunnel is now in a mineralized rock, though there is no defined lode.—*Colorado Miner*, Sept. 9th.

MONTANA.—*The Montana Company's Silver Mines and Reduction Works* are located on Spring Creek about four miles above Helena. These works, when finished, will be the most extensive and complete concentrating and reduction works ever erected in Montana. The company purchased the Argentum Mine last Fall, began work in June, and now has a solid body of galena ore extending on all sides of a 50-feet drift, assaying 110 ounces in silver and 50 per cent. lead. Day and night shifts are running and the force will soon be increased. Of first and second class ores about 1,000 tons are on the dump. The main mill is 35x56 feet and the ore shed, 33x49. The Water Jacket Furnace, Bruckner furnaces, settlers and amalgamators stand 150 feet from the main building. The power is obtained by means of a wire rope connecting with tha main building. Throughout the entire works suction pipes are arranged to gather in the dust, which will be chloridized in Bruckner furnaces and amalgamated. The blast required for the Water Jacket will be obtained by means of Knowles' air pump. The process used is KROM's dry crushing and concentrating system. The works are to be put in running order by November 1st, and to have a working capacity of 50 tons per day. The main object of the company is to work the low grade ores of the country, and to purchase ore for working, holding the Argentum ore in reserve to be worked when supplies may be short. The assay office is complete in all its departments. These works, when finished, will prove of incalculable advantage in the development of our mines by providing for the successful and profitable reduction of low grade ores.—*Helena Independent*.

NEVADA.—*The Syndicate Gold and Silver Mining Company* of Bodey District, Esmeralda County, has just made a clean-up of their first crushing. It amounts to $5,587.94. The lead is about eight feet in width, and is gold bearing. The gold is worth only $8.67 per ounce, there being a considerable amount of silver in the ore. The company have in operation a fine 20-stamp mill, and their prospects are excellent, as they have only attained a depth of 200 feet.

UTAH.—*Utah Coal Mining and Coke Company.*—The lands of this company are located upon Huntington Creek, in San Pete County, about 60 miles from Springville Station on the Utah Southern Railroad. The vein of coal now being worked is 12 feet in thickness, and entirely free from slate, shale, or other impurities. The mine is opened by tunnels, shafts, and rooms, whose roofs are supported by columns of coal that have been left for the purpose during exploitation. These chambers are about twelve feet in height, and are made more available by a "T" rail track that is laid all through the mine to a line of coking ovens, ten in number. The company anticipate having 40 ovens in full blast in a short time. With a railroad that would connect the mines with the Utah Southern Railroad, facilities would be so augmented that the coke could be sold at about half the present prices. This coke brings $25 per ton at Sandy Station, this being from $5 to $8 per ton less than Pennsylvania coke has been selling at. Some two or three years ago, coke sold in this city in car load lots at $35 to $38 per ton, and for a few months past has been selling at about $30 per ton. With the exception of the paltry sum of perhaps $3 per ton, all of this money went back East to the several railroad companies and the mine owners of Pennsylvania, thus virtually laying a tribute upon the products of this Territory of hundreds of thousands of dollars annually. With this fact in view, we know that every person who is interested in mining operations in this Territory, will join with us in extending our congratulations to this company, in supplying the long-felt and most imperative want of this country—"a cheap fuel for smelting and reducing purposes."

The Central Coal and Coke Company have, at great expense, made an excellent road to their coal bed, which is situated in Pleasant Valley, a distance of about forty-five miles from the city of Springville. This coal is of very superior quality, and is sold, at the mine, at the low rate of $2 per ton.—*Utah Miner*.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Sept. 9.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co.	42,588	1,192,535	57,526	2,181,437
D. L. and W. RR. Co.	50,882	995,495	57,606	2,162,185
Penn. Coal Co	26,341	639,594	28,874	927,697
L. V. RR. Co	21,549	635,329	21,503	635,507
P. and N. Y. RR. Co	—	17,488	1,661	76,398
C. RR. of N. J	32,737	807,842	53,496	786,296
Penn. Canal	10,037	249,283	16,684	161,916
	184,134	4,537,566	237,350	6,931,436
Lehigh Region.				
L. V. RR. Co	56,433	1,626,815	88,930	1,006,893
C. RR. of N. J	48,058	843,129	27,584	321,659
D. H. and W. B. RR.	578	29,058	1,607	52,650
	105,069	2,499,002	118,121	1,381,202
Schuylkill Region.				
P. and R. R. RR. Co.	104,982	2,736,844	174,880	2,567,897
Shamokin & Lykens Val.	21,622	532,045	27,243	836,862
	126,604	3,268,889	202,123	3,404,759
Sullivan Region.				
Sul. and Erie RR. Co.	64	27,663	—	5,557
Total	415,871	10,333,120	557,594	11,722,954
Increase	—	—	—	—
Decrease	141,723	1,389,834	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

Perth Amboy business:

	Tons.
Received for the week	17,687
Shipped for the week	11,132
On hand Sept. 9	73,745

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 375,817 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.

	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	6,048	169,598	81,500
" " " South Amboy	1,975	293,537	135,775
Shipments at Coal Port (Trenton)	3,973	165,803	78,348
" South Amboy	5,290	318,834	189,172

Receipts of Coal at Boston, for the years ending Aug. 31, 1875 and 1876.

From	1876. Tons.	1875. Tons.
Alexandria and Georgetown	94,258	112,142
Philadelphia	659,333	532,166
Baltimore	158,382	170,277
Other places	310,155	259,577
Great Britain	4,722	3,397
Nova Scotia	25,551	31,195

The Production of Bituminous Coal for the week ending Sept. 9, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	44,287	1,222,124
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,755	228,830
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	2,522	108,136
*East Broad Top	492	47,993
Clearfield Region, Pa.		
*Snow Shoe	472	35,800
*Tyrone and Clearfield	11,581	777,743
Allegheny Region, Pa.		
*Pennsylvania RR	2,089	141,586
Pittsburgh Region, Pa.		
*West Penn. RR	2,309	134,949
*Southwest Penn. RR	546	39,453
*Penn. & Westmoreland gas coal, Pa. RR.	9,695	535,947
*Pennsylvania RR	4,298	178,719

* For three days ending Aug. 31.

The Production of Coke for three days ending Aug. 31.

Tons of 2000 lb.	Week.	Year.
West Penn. RR	973	32,102
Southwest Penn. RR	5,743	344,868
Penn. & Westmoreland Region, Penn. RR.	861	34,184
Pittsburgh, Penn. RR	621	113,327
Total	8,198	524,481

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Sept. 15, 1876.

Anthracite.

THERE are no new features to the market. Some claim to be doing a very liberal business at circular prices, but it is very evident that the great bulk of trade is being done by those who purchased at auction, and who are in some cases offering large concessions from circular rates. The financial necessities of others have driven them to the acceptance of very low rates, so that it would seem that there is enough coal offering at concessions to supply the present requirements of the market.

The Pennsylvania Coal Company has announced for sale at public auction, to take place on Wednesday, the 20th inst., 100,000 tons of its coal. This is the first positive declaration that further quantities of coal are to fol-

low the last grand slaughter. The other companies will quietly look on, but be the result what it may, other coal will likely follow. One company thinks that low prices will indicate a lack of demand and necessitate an auction sale to dispose of the coal, while another company considers it the simplest and most advisable way of disposing of its coal, provided high prices rule. It is too early for the Delaware, Lackawanna and Western Railroad Company to announce its sale, provided it intends to have one, its regular day being the last Wednesday of the month.

At present the rates generally received for coal by the companies, average from $3.25@$3.50 per ton at tide-water, while, from the best information we can get, the bare cost of placing it there, not including interest or royalties, ranges from $3.50 to $4. If a large amount of coal is to be sold at auction each month, it will be very safe to calculate an average loss of fully 75c. per ton. To provide for this, should the present state of things continue long, in addition to large interest accounts and guaranteed dividends on leased railroads, will try our strongest companies, if it does not ruin them. Our figures of cost of placing coal at tide-water, may, by some persons, be considered too high, but we do not speak without some knowledge of the details of the business. There are no accounts so complicated as those of mines, and none that can receive so many different constructions, and it is from this cause that good exhibits are so frequently made, and are not followed by corresponding dividends. We know of companies that have calculated and shown, to he perfect satisfaction of inexperienced directors and stock-holders, a cost of production fully $1 per ton below what was actually found in working. In doing this the management may have deceived themselves in an effort to charge to the future what the present should always bear. Besides, there are always some unlooked-for expenses creeping into a year's business, caused, for instance, by fires in mines, "break downs,' strikes, etc., while the estimates of the cost of mining are usually based upon the most favorable conditions.

By our production table it will be seen that the decrease last week was 141,523 tons, as compared with the corresponding week of 1875, making a total decrease, since January 1, as compared with the corresponding period of last year, of 1,389,834 tons. The production last week was 415,871 tons, as against 286,124 tons for the previous week. It is very evident that there is a tendency to great over-production, and it cannot be long before the quantity of coal, in the various markets, will be so great that it cannot be disposed of by any ordinary means and hardly at any price.

Reductions in wages have been going on since the breaking up of the Combination. They have ranged from 10 to 25 per cent., and have, with but few exceptions, been submitted to without opposition. It is felt that much larger reductions are necessary, but to accomplish these it will be necessary to give steady employment to a much smaller number of men than is now employed, leaving the surplus labor to take care of itself, as is the case in other industries.

Bituminous.

The shipments of Cumberland Coal last week show a decrease of over 13,000 tons as compared with the corresponding week of 1875, whereas the Clearfield region, while showing a less production than a month ago, still maintains a fair tonnage. There is nothing to be said about this trade, not enough business being done to indicate anything. No concessions have as yet been made in railroad freights on these coals, but there are indications that some are to come when it becomes a little more fully known what prices are likely to rule for anthracite coal.

Some West Virginia gas coals being shipped from Baltimore, are being quoted at $5.15 per ton delivered in New York, while coals shipped from Richmond are quoted at $5.25 and Youghiogheny from Baltimore at $5.60. Penn and Westmoreland coals are still quoted at $6, the price at which the large contracts were made last Spring.

Coal Trade of Philadelphia.

PHILADELPHIA, Sept. 14, 1876.

From our Special Correspondent.

THE business continues to show signs of activity under the impetus given it by the present low rates for coal. The retail trade is brisk, and all the vessels reaching this port are rapidly taken up for Eastern and Southern shipments. The receipts of coal from the mines are not what they should be. Not only some collieries are working only part of the time, and even entirely stopped for want of feed-water for their steam boilers, but cars are scarce for those who are working. As the company is reported to have pretty well unloaded the cars which had been so long standing loaded, no one seems able to explain the cause of this scarcity of cars, which, to say the least, is extraordinary at a time the road needs all the tonnage it can secure. The reduction of rates of transportation on the line is not what it was expected to be, particularly to those large consumers, the blast furnaces and rolling mills. It is but very little below the old rates, the 20 per cent. deduction allowed before being withdrawn.

Freights are $1.45@$1.50 to Boston; 90c.@$1 to Washington.

Wholesale Prices of Anthracite Coal for Sept., f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	3 25	3 25	3 50	3 50	4 15	3 75
Pittston at Newburg	3 10	3 10	3 35	3 35	4 00	3 60
Wilkesbarre at Port Johnston	3 25	3 25	3 50	3 50	4 00	3 50
Plymouth, R. A.	....	....	3 50	3 50	4 15	3 40
Susque. Coal Co. at Amboy W.A.	3 25	3 25	3 50	3 50	4 00	3 30
Kingston at Hoboken	3 25	3 25	3 50	3 50	4 00	3 30
Lehigh Coals.						
Old Company at Port Johnston	4 00	....	3 60	3 60	4 00	3 30
Old Company's Room Run "	4 00	....	3 60	3 60	4 00	3 30
Sugar Loaf, Hobok. & Amb. "	4 00	....	3 60	3 60	4 00	3 30
Lehigh Coal Exchange "	4 00	....	3 60	3 60	4 00	3 30
Honey Brook Lehigh	4 00	....	3 60	3 60	4 00	3 30
Beaver Meadow at South Amboy	4 00	....	3 60	3 60	4 00	3 30
Schuylkill Coals at Philadelphia.						
Schuylkill white ash	3 00	3 00	3 00	3 00	3 50	3 00
Schuylkill red ash	...	....	....	3 10	3 60	3 00
Lorberry	....	....	4 00	4 00	4 00	3 05
Lykens Valley	....	....	4 50	4 50	4 50	3 50
North Franklin red ash	....	....	4 00	4 00	4 00	3 05

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	40c.
" " Elizabethport & Port Johnston to N. York.	40c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c

Freight by the Pennsylvania Coal Company's boats from Newburg to New York 65c.

The prices of Susquehanna coal at Philadelphia are, on lump and steamer, 25 cents per ton less; broken, egg, and stove, 50 cents per ton less; chestnut, 30 cents per ton less than at South Amboy.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 75
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	4 50	6 00
" Gas Coal at Richmond	4 00	5 50
Peytona Cannel W. Va at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	4 90
Cumberland, at Baltimore	3 65@3 80	5 10
Clearfield f.o.b. Canton, Baltimore	3 75@....	5 25

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at South Amboy, N.J., 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 95; at Greenwich, Phil., per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$4 20	$4 50	$3 80
Lackawanna coal, in yard	4 20	4 50	3 80
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh & Locust Mountain, del'd	5 50	5 50	5 00
Schuylkill Red Ash, del'd	6 00	6 00	5 50

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	22 00
American " " " "	13 00
Cannelton splint, " " "	7 50
Cannelton Block, " " "	7 50
American Orrel " " "	11@14
Red Bank Cannel " " "	10 00
Cumberland " " "	7 00

Baltimore, Md. Sept. 12, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 87	$4 72
Broken	5 25	5 10
Egg	5 35	5 20
Stove	5 76	5 61
Nut	4 91	4 76
Shamokin. (red or white ash), and "Boston," free burning white ash,		
Egg	5 35	5 20
Stove	5 75	5 60
Lykens Valley, red ash,		
Egg and stove	6 30	5 73

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. $5 50@8 00

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston. Sept. 9, 1876.

COAL has had an active market all the week, with prices well sustained towards the late quotations announced in our last. The retailing yards are very busy, and we hear of no deviations more than 25c. from the combination voted as previously reported. There has been none of the auction-sold coal received yet, though shipments have commenced. Freight rates are higher, quoting from Philadelphia, $1.35; New York, $1; and Baltimore, $1.40.—*Commercial Bulletin.*

Buffalo, N. Y. Sept. 12, 1876.

Reported by LEE & LOOMIS.

Deliv'red at	Elmira	Ithaca.	Syracuse	Rochester.		Oswego
	Afloat	Afloat.	Afloat.	Afloat	ret. del.	f.o.b.
Grate	$3 80	$2 95	$3 10	$3 80	$5 05	$4 05
Egg	3 80	2 95	3 10	3 80	5 05	4 95
Stove	4 20	3 40	3 55	4 25	5 50	4 50
Nut	3 90	3 10	3 25	3 95	5 20	4 20

Delivered at	Erie.	Buffalo.		
	f.o.b.	Afloat.	f.o.b.	ret. del.
Grate	$4 55	$4 05	$4 55	$5 30
Egg	4 55	4 05	4 55	5 30
Stove	5 00	4 50	5 00	5 75
Nut	4 70	4 20	4 70	5 45

Chicago, Ill. Sept. 12, 1876.

No change in prices of coal. Trade quiet.

Cincinnati, O. Sept. 12, 1876.

Reported by our Special Correspondent.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	——
Pomeroy coal	5 @5½c.	——
Kanawha "	7 c.	——
Cannel coal, according to quality "	10 @16c.	——
The following are the retail prices delivered		
Youghiogheny	10c.	——
Pomeroy	8c.	——
Cannel	15@22c.	——
Kanawha Semi-Cannel	10c.	——
Authracite, per ton	10 50@11 00	
Coke, at yard	7c.	——
Coke, hard and soft, delivered	9@10c.	——

Cleveland, O. Sept. 12, 1876.

Specially reported by Messrs. LAMBIE & BATES.

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 10	$4 00
Cannel	4 25	4 15
Blossburgh	$5 00	$5 00
Briar Hill Block Coal	3 50	3 25
Straitsville Coal Co., lower vein	2 90	2 90
" " " whole "	2 80	2 80
Hocking Valley	2 90	2 90
Massillon	2 90	3 00
Tuscarawas Valley	2 50	2 50
Columbiana	2 50	2 50

Office of CLEVELAND COAL EXCHANGE,

89 Seneca Street, June 3d, 1876.

PRICES TILL FURTHER NOTICE.

	1 to 10 tons.	10 tons upw'd.
Massillon, Brier Hill and Mineral Ridge, lump	$4 00	$3 75
" " " " " nut	3 75	3 50
Straitsville Lower Vein, Hocking & Shawnee, l'p.	3 60	3 40
" " " " nut	3 40	3 15
Del Carbo and Rich Hill, lump	3 75	3 40
" " " " nut	3 45	3 10
Columbiana, lump	3 25	3 00
" nut	2 75	2 55
Lackawanna and Wilkesbarre, egg and grate	7 50	7 30
" " stove	8 00	7 75
" " chestnut	7 75	7 55

No Anthracite coal to be sold for future delivery except to be subject to Exchange price at time of delivery.

H. E. CHUBB, Secretary.

Indianapolis, Ind. Sept. 12, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers. Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE,

Wilkes-Barre and Lackawanna (all sizes) $9 75 per ton,
Lehigh, retail $11 50 per ton.

Louisville, Ky. Sept. 12, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to	10 50

Screened Pittsburgh per load $3 00
Screened Raymond City 2 75
Pine Hill (Kentucky) 2 75
Cannel $5 to 5 50

Milwaukee, Wis. Sept. 12, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Trade is quiet. Our prices for coal are:

Retail price per ton of 2000 lb.

Lehigh Lump	$ 9 00	Briar Hill, select	$7 00
Lehigh Prepared	9 50	Blossburgh	7 00
Lackawanna (all sizes)	8 50	Cannel	8 00
Pittston	8 50	Pittsburgh	6 50
Scranton	8 50	Steam coal	5 50

New Orleans, La. Sept. 10, 1876.

Reported by C. A. MILTBERGER & Co.

Pittsburg coal, retail, per bbl	50c.
" wholesale	30c.
" steamboats, per box	40c.
" to manufacturers	45c.
" shipments, per hhd	$5 50
Anthracite, wholesale, per ton	
" retail, "	12 00
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	
" " retail, "	50c.
St. Bernard wholesale, per bbl	30c.
" retail, "	45c.

Richmond, Va. Sept. 11, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Prices are now as follows:

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 00
" semi-Cannel	4 00	Clover Hill Coal	3 50
Coalburgh Splint	4 00	James River Bitum	3 30
Lewiston "	4 00	" " Carbonite,	5 00
Kanawha Gas coal	3 90		

San Francisco, Cal.

From the *Commercial Herald*, Sept. 7, 1876.

Imports from Jan. 1st to Aug. 29:

	tons.		tons.
Anthracite	9,238	Vancouver Island	67,783
Australian	75,496	Rocky Mountain	152
Coos Bay	26,039	Seattle	63,814
Cumberland	7,527	Bellingham Bay	15.895
English	33,783	Chili	2,076
Mt. Diablo	65,590		

There is very little Foreign upon the market, as nearly all the cargoes arriving come to hand under previous contract, having been bought to arrive months ago at $8 50 down to $8. The excessive supplies in August have caused a further sharp decline in English Steam, for which we quote $7 37½@7 75; Australian commands $8@8 25 per ton; Anthracite, $12; and Cumberland, $13 50@14 for cargo lots. Arrivals during the week embrace the following cargoes: *Birchvale*, Glasgow, 1,368 tons; *Gem of the Ocean*, 1,150 tons Seattle; *Talisman*, Liverpool, 1,635 tons; *Admiral*, same, 1,133 tons; *Isaac Reed*, same, 1,703 tons; *Penshaw*, 1,200 tons Newcastle, N. S. W. Coast supplies from the North and from British Columbia continue large and free, as well as from California Mt. Diablo. Low prices rule. Bark *Lizzie*, from Seattle, has 1,315 tons. The cargo of 750 tons Australian, per *Papillon*, from Sydney, after a fortnight's hard work, has been sold at $6 50. This was the second cargo received here from the new Wallsend mine, and has not yet made itself a good reputation among consumers.

St. Louis. Sept. 9, 1876.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

The following is a correct list of prices of coal here to-day:

Retail prices, delivered.

	per ton.
ANTHRACITE.	
Lackawanna	$9 00@10 00
Wilkes-Barre	9 00@10 00
Schuylkill	9 00@10 00
Lehigh	11 00@12 00
BITUMINOUS.	
Blossburg	9 00
Pittsburg	4 50
Indiana Block	4 00
Big Meadow	3 00
Illinois Coals	2 50@3 00
Connellsville Coke	9 00

Montreal. Sept. 11, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Toronto, Ont. Sept. 11, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals.

per ton of 2240 lb.

	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	1 50	1 45	2 01	1 92	2 15
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	70
‡ Philipsburg, N. J., (46 miles)	58	44	1 00	91	1 14
Elizabethp't, (114 m) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 23	1 09	1 65	1 56	1 79
High Bridge, N. J.	1 95	1 75	2 43	2 34	2 52
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	1 89	1 75	2 31	2 22	2 45
Jersey City, N. J., (121 miles) and New York, via L. V. RR.	1 59	1 45	2 01	1 92	2 15

From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR. $1 44
From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR 1 25
From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware Lackawanna and Western RR., Morris and Essex Division 65

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

OFFICE OF THE PA. & N. Y. R. R. Co.,
Bethlehem, Sept. 1st, 1876.

On and after this date the rate on coal for Buffalo, for Watkins, Ithaca, and Weedsport, for water shipment; Auburn, for New York Central R. R.; Sterling, for Lake Ontario Shore R. R. and Fair Haven, will be 98 cents per gross ton, between Coxton and Waverly. On Coal for Rochester, via Erie R. W., Salamanca and points west thereof, an additional charge of 10 cents per ton will be made to cover transshipment charges at Waverly.

ROBERT H. SAYRE,
President.

Schuylkill Coals.

per ton of 2240 lb.

	From Pine Grove	From Tamaqua.	From Schuylkill Haven.
To *Port Richmond*, for shipment, via P. & R. R. R., Main Line	1 20	1 15	1 00
Philadelphia, Retail yards	1 45	1 40	1 25
Harrisburg, via Lebanon Valley Branch	98	1 37	1 22
Allentown, via East Pennsylvania Branch	1 22	1 17	1 02
Lancaster, and Points on Lancaster Branch, via R. & C. R.R	1 30	1 25	1 10
Dauphin, via Schuylkill and Susquehanna Branch	70	1 18	1 03
Slatedale Junction via Berks and Lehigh Branch	1 34	1 29	1 14
Lebanon, via Lebanon and Tremont Branch	81	....	....

From *Tamanend* to *Catawissa*, via Catawissa and Williamsport Branch Railroad 90
From *Tamanend* to *Williamsport*, via Catawissa and Williamsport Branch Railroad 1 25

Coal sent to points on the Catawissa and Williamsport Branch will be charged one and one-half cent per ton per mile, and two cents per ton additional to Tamanend.

From *Port Clinton* to *Philadelphia* via Schuylkill Canal, including freight and charges for the use of cars and barges, and for tolls (exclusive of cost of unloading .. 59

An additional charge of 25 cents per ton will be made on Chestnut and Pea Coal to whatever point consigned. If the shipper signs a release of all demands arising from a deficiency of weight at the place of destination, and agrees to indemnify the Company from all claims by reason thereof, such additional charge will not be made. Releases, properly prepared, will be furnished, and can be signed at the coal offices of the Company, at St. Clair, Palo Alto, Schuylkill Haven, Mount Carbon, Pine Grove, and Tamaqua.

For shipment via Main Road or Schuylkill Canal, one and one-half cents per ton per mile, and two cents per ton additional, to Port Carbon, Mount Carbon, Schuylkill Haven, Pine Grove, Tamaqua, or Port Clinton, for Canal, as the case may be.

Coal sent to points on the Catawissa and Williamsport Branch will be charged one and one-half cent per ton per mile, and two cents per ton additional to Tamanend.

For consumption at local points in coal region, including Shamokin, Herndon, Schuylkill Haven, Pine Grove, and Tamaqua, three cents per ton per mile, and two cents per ton additional; and a charge for *car service*, of fifteen cents per ton to individuals, and five cents per ton to manufacturers, when in Philadelphia and Reading Railroad cars.

Sent westward via Northern Central Railway (in N. C. R. W. Co 's cars), four and two-tenths cents per ton per mile, to Locust Gap, Shamokin, or Herndon.

No charge will be made less than twenty-five cents per ton, including freights, tolls, and car service.

One mile extra will be added for coal passing through the East Mahanoy Tunnel.

Fractions of distances and rates will always be stated in *tenths*.

No charge will be made for weighing or making returns of coal shipped, and the latter will be furnished free of charge, upon application to the Weighmaster; if these returns are to be sent by mail, envelopes, properly stamped and addressed, must be furnished to the Weighmasters.

All coal will must be charged the rates (both lateral and Main Line) current on the day it is weighed; it will also be way-billed on the same day.

Freights

Representing the latest actual charters up to Sept. 14, 1876.

Per ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	1 40
Albany	....	....	...	....
Alexandria	....	....	....	....
Amesbury, Mass	....	....	....	1 50
Bangor, Me	....	....	....	1 25
Bath, Me	....	1 45	1 40	1 25
Baltimore	....	....	....	....
Boston, Mass	1 45@1 50	1 50	1 50	1 25
Bridgeport, Ct	....	1 35	....	55
Bristol, R. I.	....	....	....	85
Cambridgeport, Mass.	....	....	...	1 25
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	....	....	....	1 25
Fall River	....	1 40	1 40	85
Hackensack	....	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	....	1 65	1 00
Hoboken	....	....	1 25	40
Hudson	....	....	1 40	....
Jersey City	....	....	1 25	40
Lynn, Mass	....	....	....	‡1 25
Middletown	....	....	....	....
Mystic	....	....	....	....
Newark	....	....	1 30	....
New Bedford	....	1 40	1 40	85
Newburyport	....	1 65	1 60	1 40
New Haven	....	1 35	1 40	60
New London	....	1 35	1 40	70
Newport	....	....	....	85
New York	....	1 30	1 25	40
Norfolk	....	....	....	75
Norwalk	....	....	....	60
Norwich	....	....	1 45	75
Pawtucket	....	....	....	‡95
Philadelphia	....	....	....	....
Portland	....	1 45	1 40	85
Portsmouth, N. H.	....	1 65	1 60	1 00
Providence	....	1 35	1 40	1 15
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	1 80	....
Sag Harbor	....	....	....	1 00
Salem, Mass	....	1 50	1 60	1 25
Salisbury Pt., Mass.	....	....	....	....
Stamford	....	....	....	....
Stonington	....	....	....	....
Taunton	....	....	....	....
Troy	....	....	....	....
Warren, R. I.	....	....	....	85
Wareham	....	....	1 50	....
Washington	90@1 00	....	....	....
Weymouth	....	....	....	....
Wilmington, Del	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles), the legal charge is 2 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $4 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 75 cents per net ton.

From Cumberland to Baltimore (178 miles) $2.02 per ton of 2240 lb., or $1.80 per net ton (¼ cent per ton per mile for use of hoppers over C. & P. RR.).

From Cumberland to Georgetown (152 miles) by canal, $1.10. Tolls, 46 cents.

From the Mines to Piedmont, 4 cents per ton of 2240 lb. per mile on distances less than 4 miles, and 3 cents per ton per mile on distances over 4 miles, and 2 cents per ton per mile on distances over 10 miles.

From Piedmont to Baltimore (206 miles) $2.34 per ton of 2240 lb., or $2.08 per net ton.

From Osceola to Greenwich, Phila. (say 248 miles) per T. & C. RR., per ton bituminous coal of 2000 lb., less drawback of $1.46. $2.15; rate per gross ton, $2.60.

From Osceola to South Amboy, N.J., (317 miles) per 2000 lb., $4.03, less drawback, $1.03; rate per net ton, $3; add 12 per cent. for gross ton, 36 cents, terminal expenses, shipping, 20 cents; rate per gross ton, $3.56.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Sept. 15, 1876.

American Pig.—The Thomas Iron Company reports sales of 2,000 tons of Nos. 1 and 2 foundry and forge. We also note sales of 600 tons of Crane iron, all at regular quotations. The Thomas Iron Company has not a pound of iron on hand, and with it matters are encouraging; but it is almost a single exception, for from other quarters we only get the report of dull business. We quote No. 1 foundry at $22; No. 2, $20; and forge, $19@$20.

Scotch Pig.—This article shows but little life. We note sales of 150 tons of Coltness and 75 tons of Eglinton. We quote Coltness at $28.50@$29; Glengarnock $28; and Eglinton, $27.

Rails.—We note sales of 4,000 tons of steel, for South Western delivery, and 1,300 tons of 30 lb. iron rails, Philadelphia delivery. We quote steel rails at mills at $52@$54 and iron at $37@$42.

Old Rails.—Are without business and quoted at $21.

Scrap.—We note a sale of 200 tons on private terms and quote at $27.

Philadelphia Iron Trade.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & CO., Iron Merchants, 333 Walnut Street, Philadelphia. Week ending Sept. 14, 1876.

THERE has been no change in the iron market since our last report. The inquiry continues, and sales are more frequent and of larger lots, but no change in prices: the tendency, if anything, is to firmer prices. We report sales of 1,000 tons No. 1 Crane at $22; 1,000 tons Crane Gray Forge, $19.50; 50 tons No. 1 St. Charles, $22.50; 50 tons Checkies, $22.50; 100 tons Montgomery No. 2 X, $20. We quote: No. 1, $22 to $22.50; No. 2, $20 to $20.50; Gray Forge, $19 to $19.50. Special brands of Gray Forge are bringing $22.

BAR IRON continues dull and depressed, the reduction to 2.3c. bringing no new business, buyers just buying as they need, and not a pound more. We quote 2·2c. to 2·3c. per lb.

RAILS.—New iron rails are in more demand, but we do not hear of any large transactions at this time. We quote $38 to $42 at mill for iron, and $56 to $58 for steel.

SCRAP is dull; lots of wrought are pressing on the market without takers.

CAST is more in demand but at low prices. We quote: Wrought, $22.50 to $27.50; cast, $16 to $19.

Baltimore. Sept. 13, 1876.

Specially reported by Messrs. R. C. HOFFMAN & CO.

The iron market remains dull and sales light, at about quotations:

Baltimore Charcoal	$30@34	Anthracite No. 3	$20@21 00
Virginia Charcoal	28@34	Mottled and White	17@19 00
Anthracite No. 1	24@25	Charcoal C. B. Blooms	63@65 00
" No. 2	21@22	Refined Blooms	50@55 00

Boston. Sept. 9, 1876.

PIG is having a moderate trade, an improvement on the business of the month past, and at rather more uniform prices. A test of the market is the offer of one of our largest foundries to a prominent holder here to relieve him of over 1,000 tons No. 1, at $12.75 cash down, but the offer was refused. A renewal at an advance has not been made. Holders continue to quote from $21 to $25 for the various grades.

BAR is moving in better spirit, but at exceedingly low prices, the range starting from $49 and quoting upward according to the schedule offered, and the buyer's credit. Common iron is selling at about $40.

STEEL is selling to the sleigh men with a little more spirit, as also to agricultural tool people. In machinery a slight concession has quickened the inquiry, but not actually increased sales. We quote American tool, 14c. @15c.; American machinery, 8c.@9½c.; Bessemer tires 5¾c.; Sweet's Excelsior Tire, 7½c.; English tool, 15½c. gold.—*Commercial Bulletin.*

Chattanooga, Tenn. Sept. 12, 1876.

Specially reported by J. F. JAMES, pig iron broker, etc., 233 Market Street.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$21@ 22		
" " " " No. 2 foundry	20@ 21		
" " " " gray forge	17@ 18		
" and Georgia coke, No. 1 foundry	18@ 19		
" " " " No. 2 foundry	17@ 18		
" " " " gray forge	15@ 16		
White and Mottled	14@ —		
Tennessee and Georgia cold-blast car wheel	23@ 24		
Alabama " "	23@ 24		
Old Rails	cash 22 00		
Cast Scrap	" 12		
Wrought Scrap	" 18@ 20		

Cincinnati. Sept. 12, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market remains quiet and we have no change to report.

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	4 mos
" No 2, "	23 00@	4 mos
" Mill	20 00@21 00	4 mos
Tennessee, No. 1, Foundry	23 00@	4 mos
Tennessee, No. 2, "	22 00@	4 mos
" Mill	20 00@	4 mos
Missouri, No. 1, Foundry	@	4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 00@22 50	4 mos
" No. 2, "	20 50@21 00	4 mos
Ohio Mill	19 00@19 50	4 mos
Missouri, No. 1 Foundry	25 00@	4 mos
" No. 2, "	24 00@	4 mos
" Mill	23 00@	4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	4 mos
Tennessee "	25 00@32 00	4 mos
Missouri "	32 00@35 00	4 mos
Alabama "	25 00@32 00	4 mos

BLOOMS.

Charcoal	60 00@ 75 00	cash

SCRAP IRON.

Cast	50c.@ 85	cash
Wrought	1 00@1 40	cash

Cleveland, Ohio. Sept. 12, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@
No. 2, " " "	26 00@
No. 1, Anthracite	25 00@
No 2, "	23 00@
No. 1, Bituminous	24 50@
No. 2, "	22 50@
American Scotch, No. 1, Cherry Valley	@
" " B—1, " "	@
" " No. 2, " "	@
No. 1, Massillon	25 50@
B—1, "	24 00@
No. 2, "	21 50@

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 50@
No. 4 " " "	27 50@
Nos. 5 and 6 "	27 00@

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00@

FORGE IRON.

No. 1, Gray	22 00@
White and Mottled	2c 00@

Louisville. Sept. 12, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is without animation, buyers still adhere to the hand to mouth policy.

The usual time, four months, is allowed on quotations below.

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$23 00@25 00
No. 2 " " "	21 00@22 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " "	21 00@22 00
No. 1, Mill, " " " "	19 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	22 00@23 00
No. 2, " " " "	20 00@21 00
No. 1, Mill, " " " "	19 00@21 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " " "	@
No. 1 Mill, from Missouri Ores	24 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@43 00
" " Tennessee "	25 00@30 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@42 00

Milwaukee. Sept. 12, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No. 1	$28 00
" " " No. 2	27 00
" " " No. 3, 4 & 5	25 00
" " " No. 6	25 00
Mil. Anthracite L. S., No. 1	27 00
" " " No. 2	26 00
Wisconsin Iron, No. 1	26 00
Mahoning Valley Bit's No. 1	32 00
" " " No. 2	30 00

Pittsburg, Pa. Sept. 12, 1876.

Specially reported by A. H. CHILDS.

There has been rather more inquiry for gray forge pig iron during the past week, and on the whole a more active market than for some time past. Foundry iron continues very quiet. Quotations are:

No. 1 Foundry	23 50@25	4 mos.
" 2 "	23 00@—	"
Gray Forge	21 00@22 00	"
White and Mottled	19 00@20	"
Warm blast Charcoal	23 00@29	"
Cold blast Charcoal, Western	40 00@45	"

Richmond, Va. Sept. 13, 1876.

Reported by ASA SNYDER, Esq.

Charcoal irons continue inactive. Sale of 100 tons since last report at full quotations for best brands. Receipts are still very light.

Virginia Cold Blast Charcoal Pig Iron						$27 to $33
" Warm " "						24 to 28
" " " Coke			"	"	1 X	23 to 24
" " " "			"	"	2 X	21 to 22
" " " "			"	"	3	20 to 21
" Anthracite 1 X						— to —
" " 2 X						— to —
" " 3						— to —

San Francisco, Cal.

From the *Commercial Herald*, Sept. 7, 1876.

The demand for tin plate is at present restricted and prices favor the buyer. We receive free supplies of Scotch pig iron, the bulk of which was placed prior to arrival, giving full stocks to our foundrymen, without placing any upon the market. The present quotation is entirely nominal. The Oswego Iron Works (Oregon) have ceased operations by reason of continued low prices ruling. The market for all sorts of goods in this line seems to be badly demoralized, and in the absence of reported sales it is difficult to give reliable quotations. Of pig iron the present nominal rate is $30@31 for Scotch and English. Tin plate—IC coke 10x14 and 14x20 at $7 50; IC charcoal, $8 50; Roofing charcoal (terne), 14x20, at $8 25. Sheet zinc may be quoted at 9½@10c.

Our monthly importations of Foreign, American, and Oregon pig iron, for the first eight months of 1875-6 compare as follows:

	1875. Tons.	1876. Tons.
January	1,712	4,506
February	1,831	1,193
March	2,083	1,914
April	1,521	999
May	2,500	625
June	1,360	694
July	4,555	892
August	1,159	2,941
Total	16,721	13,764
Decrease this year		2,957

St. Louis. Sept. 13, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market remains about the same in regard to price, but demand is much on the increase. "Hard Pan" has undoubtedly been struck, and a change is soon to take place. We quote same as last.

Mo. Stone Coal No. 1 Fy.	$25@26	Massillon, A No	1.29@30
" " " 2 "	23@24	" " B "	1.34@—
" " Gray Mill,	22½@23	" " "	2.28@—
" Charcoal No. 1, Fy.	23@24	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	22@23	" " " Tenn.	30@33
" " Gray Mill,	22@23	" " " Ala.	30@33
Tenn. " No. 1, Fdy	23@24	" " " H. R.	33@35
" " " 2, "	22@23	Mo. Charcoal Blooms	50@65
" " Gray Mill	22@23	" Scrap "	45@55
Va. Coke, No. 1, Fdy.	24@25	" " hammered Billets	75@80
" " " 2, "	23@24	Assorted Bar Iron	2 50, 60 days
" "Gray Mill,	21@23	H. R. Char. No. 1, Fdy.	25@26
" " " 2, "	24@25	No. 1 Wrought Scrap	90c. cwt.
" " Gray Mill,	24@25	Heavy cast	" 70 "
		Light "	" 50 "

Montreal. Sept. 5, 1876.

We continue to quote: Pig iron, Eglinton and Clyde, $18@19.00; Carnbroe $19@20; American $20@21; Summerlee and Calder $19.50@20.50; Langloan and Gartsherrie $20@21; Coltness $22.50@23; Hematite, $30@31. Bar, per 100 lb., Scotch and Staffordshire, $2.05@2.15; best do., $2.25@2.35. Swedes and Norway, $4.75@5.50; Low Moor and Bowling, $6.50@7.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Sept. 15, 1876.

Two articles on the list have shown a large business, while there is more doing all around, and there is certainly a better feeling, but it may be crushed before another week has passed.

Gold Coin.—During the week under review, gold has ranged from 109⅜ to 110¾, and closed at 110.

Bullion.—The prices of silver have advanced since our last. The London quotation is 51¼d., while here it is 111⅛@112. The San Francisco market quotes at 14 per cent. discount. Gold bars are unchanged in value, at par, to ¼ per cent. premium.

Copper.—There have been sales during the week of about 4,000,000 lb. for export, at a private price, but supposed to be at from 18c. to 18⅛c. The indications now are that, with the copper which will be exported in a manufactured shape, we shall ship abroad about 10,000 tons of this year's production. At the present time there is very little copper being offered, although there is as little call for it. Prices are firmer, 20c. being asked, and 19¼c. bid. The statistical position of our market is such that any unexpected demand would advance prices four or five cents per lb., or to the import price.

Tin.—Under a limited business this article is unchanged in prices. The London quotations to-day are as follows: Straits, £71 10/; L. & F., £75@76; and re-

fined, £77@78. Our prices in gold are as follows: Straits, 17¼c.; L. & F., 16¾c.; and Banca, 19¼c.

Tin Plates are in very good jobbing demand at the following prices in gold, per box: Charcoal tins, $7.12½@7.25, and ternes, $6.50@6.62½; coke tins, $6.25, and ternes, $5.87½@6.

Messrs. ROBERT CROOKS & Co., of Liverpool, under date of August 31, say of tin plates: "There is no new feature to report. Makers are refusing buyers' bids, asking as a rule 6d. more, and both parties being firm, very little business is passing. All depends on the course of trade during the next few weeks to decide which side will give way. Many of the makers are not strong enough to keep without orders, and on the other hand it would not require very heavy additional buying to supply those weaker works with occupation for the next month."

Lead.—There have been sales of 500 tons of lead upon the spot, and 400 tons of Western at figures said to range from 6c.@6·05c. gold.

Antimony is quiet at 15½c. gold.

Spelter and Zinc.—Domestic spelter is very quiet at 7¼c., currency. Sheet zinc is held at 8c.@8½c., gold.

Quicksilver is quoted at £8 8/ in London; 51c.@52c. in this city; and 45c.@47c. in San Francisco.

The San Francisco *Commercial Herald*, of Sept. 7, says of Quicksilver: "The *Great Republic*, for China, on the 1st inst., carried 1,475 flasks, and to Japan 35 flasks. The bulk of this was purchased at 45c., which may now be called the current quotation, with very light available supplies.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Sept. 15, 1876.

WE have to report the most active dealings in the coal stocks for the past week that have ever come under our notice; it has, in fact, almost amounted to a panic. The total sales aggregated 515,167 shares, the fluctuations in all of the prominent stocks showing a difference of over 10 per cent.

Delaware, Lackawanna and Western Railroad stock has sold down to 70 on seller's options of sixty days, and up to 80¼ regular transactions, closing at 77⅞, which is a decline of ⅞ from our last. 358,347 shares have changed hands, but a large amount of this represents speculative transactions. It is a question at present whether the company will declare a dividend or not; this would require about $650,000 at the annual rate of 10 per cent., as paid heretofore, and a proportional lessened sum should a lower rate be declared. It is thought that the last dividend was paid largely out of the surplus funds of the company, and if one is declared for the quarter now closing, it will also have to be drawn from the surplus. Leading directors already oppose this, and on the very excellent ground that it is bad policy to do so. The stock may further recede if they don't pay a dividend, and it is almost certain to go down if they do pay one, and simply because it has not been earned.

We note in the financial columns of the New York *World*, of to-day, a semi-official statement of the condition of this company. It is highly favorable, but still lacks some detailed information that would be desirable. We shall probably refer to this and that of the Central in our next.

New Jersey Central Railroad.—Over 131,000 shares of this stock has been sold during the week between 33⅝ and 20⅝ as the extreme, prices closing at 22½, which is a decline of 8¾ per cent. The President of the company has issued a report to the stockholders showing the condition of the company. This statement is a most damaging one, in fact it shows the company to be in a worse condition than its worst enemies suspected. Messrs. CHARLES A. SHERMAN and JOHN LEISENRING have resigned their positions and are succeeded by Mr. E. C. KNIGHT, President of the Boundbrook and Delaware Railroad, and Mr. HENRY LEWIS, a Philadelphia merchant. The company has authorized a mortgage for $5,000,000 to meet maturing obligations. This is to be a first mortgage on sections of the property like the Long Branch Line, and a "blanket" mortgage on everything else. This loan is not at present meeting with any success, nor does there seem to be much prospect of so doing, in fact at present there is every likelihood of the company going into the hands of a receiver.

Delaware and Hudson Canal Company.—This stock has been very largely dealt in during the week, nearly 24,000 shares having changed hands at from 60, seller 60 days, up to 76 regular, the former price being at the beginning of the week. The final quotation of 70 shows a decline of 5¾ per cent. from our last. The *Pittston Gazette*, of the 8th inst., says with regard to this company: "That it has been estimated that they will fall short, one million dollars in the running expenses this year."

Consolidation Coal Company's stock has sold down to 32½ with sales of 1,000 shares for the week.

Bonds.—The dealings in these have amounted to $235,500 principally in the New Jersey Central Railroad issues, quotations in all instances being lower.

Quotations and Sales of Stocks and Bonds.

For the week ending Sept. 15, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	250	50
Consolidation Coal Co	35	32½	32½	1000
Spring Mt. Coal Co	—	—	*55	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	*13½	—
Del., Lack., and West. RR. Co	80¾	73⅛	77⅞	358,347
New Jersey Central RR. Co	33⅝	20⅝	22½	131,518
Delaware and Hudson Canal Co	76	63¾	70	23,052
Quicksilver Mining Co. pref'd	19	18⅜	17	250
" " Common	—	—	13	150
Mariposa Land & Min. Co. pref'd	—	—	6	200
St. Louis & Iron Mountain RR	—	—	—	—
Lehigh & Wilkes-Barre Coal Co	—	—	—	—
Total Shares sold				515,167
Sales for the week previous				336,630
Increase				178,537

* Nominal.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	....	.... @109½
" " " 7's Con'ble	J. & D.	....	.... @ ....
Cent'l RR. of N.J., 1st M., New	F. & A.	25,000	103¼@109
" " " 1st Cons.	.....	72,000	71 @ 91
" " " Convert'le	M. & N.	85,000	65 @ 79
Lehigh & W.-B'e, Con. Guar'd.	.....	15,000	45 @ 60
Am. Dock & Imp. Mt. Bonds	J. & J.	2,000	.... @ 60
Del. & Hud. Can., 1st M., 1891	.....	4,000	.... @105
" " " 1884	.. ....	.....	105 @106
" " " 1877	.....	.....	103¾@103½
" " " Coup. 7's, 1894	.....	.....	.... @108½
" " " Reg'd 7's, 1894	.....	.....	.... @ ....
St. L. & Iron Mountain, 1st M	F. & A.	20,000	98¾@ 99
" " " 2d M	M. & N	1,000	.... @ 73
Chesapeake & Ohio 6's, 1st M.	.....	11,500	25⅛@ 26½
" " Ex. Coupon	.....	.....	... @ ...
Mariposa Gold Loan con. 7s	.....	.....	... @100⅝
Total sales		$235,500	

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, Sept. 14, 1876.

THE sales at this market for the past week have amounted to 78,304 shares. This is a decline of nearly 17,000 shares from the business reported the previous week. The quotations generally exhibit an advance, the improvement being pretty well maintained throughout the week. No doubt the enormous increase in the passenger earnings of some of the principal roads centering in Philadelphia is a sufficient explanation for the firmness of the quotations.

Pennsylvania Railroad stock has changed hands to the extent of 35,654 shares at from 47⅛, seller 30 days, to 48⅞ regular, closing ¼ below the highest quotation.

Reading Railroad.—Nearly 8,000 shares of this stock have changed hands, closing ¼ higher.

Lehigh Valley Railroad.—About 1,700 shares of this stock have sold between 51⅛ seller 30 days, to 54 regular, closing at 52. This company announces a quarterly dividend of *two* per cent., payable on the 16th instant. This is equal to an annual decline of 2 per cent., or from 10 per cent. to 8 per cent.

Lehigh Coal and Navigation Company.—This stock has advanced to 32½ from 29 as in our last. Sales for the week aggregate 31,612 shares.

Bonds are without special feature, the transactions amounting to $96,000, a falling off of nearly $100,000 from our last.

Pittsburg and Castle Shannon Railroad.—The track of this road, from Pittsburg to Castle Shannon, six miles, is being re-laid with steel. In addition to its coal business, the road has, this season, done a large passenger excursion business; a camp meeting ground and pleasure grounds have been established on the lines.

South-west Pennsylvania Railroad.—The track is now laid to Uniontown, Pa., thirteen miles south by west from Connellsville, and five miles beyond the late terminus of the road. Its whole length is now thirty-eight miles from the junction, with the Pennsylvania at Greensburg south to Connellsville, and thence south by west to Uniontown. The road is worked by the Pennsylvania Railroad Company under lease.

Chesapeake and Delaware Canal Company.—52 shares of this stock were sold at auction during the week at $20 per share.

Allentown Iron Company.—24 shares of this stock were sold at auction during the week at $35 per share.

Quotations and Sales of Stocks and Bonds.

For the week ending Sept. 14, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares
Lehigh Valley RR. Co	54	52	52	1,718
Pennsylvania RR.	48⅞	48⅛	48⅜	35,654
Reading RR.	44¼	44	44⅛	7,712
Lehigh Coal and Nav. Co	33⅞	28¾	32¼	31,612
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*25	—
Fulton Coal Co.	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	*85	—
St. Nicholas Coal Co.	—	—	*1	—
Cambria Iron Co	—	—	16	1,600
Crane Iron Co.	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	71½	8
Total shares sold				78,304
Sales for the week previous				95,027
Decrease				16,723

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	—	— @107
" " " 2d " "	—	— @102
" " " 3d " cons	—	— @ 38
Lehigh Valley RR. Con. mtg. 6s	9,000	99¼@ 99¼
" " " 7s, 1910	11,000	111 @111½
" " " 6s Reg	1,000	108¾@—
" " " 1st M. 6s coup	—	— @106
Pennsylvania RR., 1st mtge. 6s	11,000	106½@107
" " gen. " cou. 1910	6,000	106¾@106⅞
" " gen. " 6s, reg	—	— @107½
" " Cons. M. 6s reg	—	— @100
Phil. & Reading RR. 7s '93	—	— @110
" " " G. M. 7s, reg.	3,000	— @107½
" " " 7s cou.	9,000	— @108½
" " new convertible 7s	13,500	96 @ 96⅜
" " 6s 1880	—	— @102⅝
" " debenture 6s	700	— @ 77
Phil. & Reading C. & I. Co. Deb. 7s	—	— @—
" " Tamaqua & Swatara tract.	—	— @ 80
Lehigh Coal & Nav. Co., 6s '84	1,000	— @102
" " " RR. 6s, '97	4,300	— @101
" " " 6s, '77	—	— @ 97
" " " 6s gold loan	22,500	95⅛@ 97
Penn. Canal, 6s	—	71½@ 71¾
Penn. and N. Y. Canal, 7s	4,000	— @110
Ches. and Del. Canal, 6s	—	— @ 85
Susquehanna Canal, 6s	—	— @ 70
Delaware Division Canal, 6s	—	— @—
Susquehanna Coal Co. 6s	—	— @ 77
Buck Mount Coal Co. 6s	—	— @—
Penn. Gas Coal Co. 6s	—	— @—
Honeybrook Coal Co. 7s	—	— @—
Total amount of sales	$96,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, Sept. 15, 1876.

We note a continued decline, in nearly all of the San Francisco mining shares, a few exceptions to this are noticeable but the general tendency seems to be to gradually lower prices, in no instance is the decline over $4 per share, and this in Justice, the present quotation being $18, against $22, as reported in our last. Yellow Jacket, Crown Point, and Overman are slightly better also, Raymond and Ely, this stock having advanced $1 per share, the present quotation being $6.

We take the following from the Gold Hill *News* of the 7th inst:

Imperial Consolidated.—Daily ore yield, forty tons; principally from the stopes and breasts of the North winze below the 2,000-feet level, which continue showing well both North and South, with improvement as further developed. Superintendent Hardy is pushing the main drift North at the 2,000-feet level as lively as possible, in order to effect a connection with the Alpha drift, which is coming southward to join it. This connection will be made very shortly, and is a very important and desirable one for air circulation and working purposes. Only about twenty-five or thirty feet more remains to be run. The air connection recently completed with the Bullion shaft is being utilized to good advantage by being sent down through the winzes to the 2,000-feet level, and up and out through the incline, thus ventilating and cooling a very warm section. In the East drift from the bottom of the South winze, which is being run to connect with the drift North from the Yellow Jacket Mine, about four feet per day is the rate of regular progress. This also is a very desirable and important connection to be made. When this is completed, the 2,100-feet level of the Imperial will be opened and developed, and still deeper operations can be indulged in to good advantage. Total yield of the mine for August, 1,200 tons of ore, giving a bullion product of about $78,000, of which over-half was gold.

Sutro Tunnel.—Face of header in hard rock, with considerable increase of water coming in the last few days, which interferes with blasting and renders advancement much slower than it has been. The tunnel having penetrated already far into the precincts of the great, broad Comstock ore belt, the tapping of a water vein at any time is to be expected, and is not an unfavorable circumstance, as indicating proximity to an ore vein or body. Total length of tunnel 14,285 feet, and rock becoming softer.

Savage.—The powerful new pumping machinery is started up and doing excellent work at reducing the hugh flood of water in the mine.

California.—Daily yield 700 tons, principally from the 1,500 and 1,600-feet levels. The ore stopes and breasts are looking splendidly and yielding a very rich character of ore. At the 1,600-feet level especially the ore is of exceeding richness, the south drift showing decided improvement in that respect. The north drift at the 1,400-feet level is being retimbered. The main shaft is now repaired and in good order, and hoisting is going on through the Ophir shaft as it was before the recent cable breaking accident. The new mill is being started up, and the yield for the present month will be considerably increased over that of last month. The yield for August was but a little short of $2,000,000. Sinking the C. and C. shaft deeper is resumed. Considerable water is met with, rendering progress necessarily slow, and giving the pumps lively work to keep it reduced.

Consolidated Virginia.—The yield of ore is being largely increased, owing to better extraction and milling facilities. The shaft is in excellent condition down to the 1,550-feet level, where the station has been enlarged and retimbered. The ore breasts and stopes are looking and yielding splendidly, and 150 tons per day is being hoisted through the Gould & Curry shaft. Two more mills are set to work on ore from this mine. The south drift the at the 1,400-feet level is being retimbered. The machinery works as well as could be desired, and the mine is in a more prosperous condition than it has been for months.

Justice.—Yielding 120 tons daily from the ore stopes of the 400, 500 and 600-feet levels, which continue looking and yielding well at all points, assays from the 400-

feet level running as high as $300 to the ton. At the 800-feet level crosscut No. 1 east has its face now in a fair quality of milling ore which shows constant improvement as further cut into. Crosscuts Nos 2 and 3 are also in the same class of ore, evidently the same vein or body; width not ascertained as yet. At the 1,000-feet level the main drift is being steadily advanced southward, with the face in regular and favorable vein formation. The cross-cut northeast from the north drift at this same level is passing through very favorable vein matter consisting of soft porphyry, clay seams and bunches of quartz, giving good assays of gold and silver. Some very rich little bunches of sulphurets are frequently met with. Sinking the main incline deeper makes very excellent progress. The machinery and everything in and about the mine operates well and efficiently.

Sierra Nevada.—The body of hot water tapped by the drift at the 1 750-feet level interferes with work at that point, but it is subsiding and work will be resumed there shortly. The body of quartz developed at the 1,250 and 1.500-feet levels north, shows better as further prospected. Nothing new at the other working points in the mine.

Hale and Norcross.—The new and powerful pumping machinery has started up and is now in full and successful operation, getting the water out of the flooded lower levels of the mine. At the present rate of progress mining work will be resumed at the lower level very shortly.

Union Consolidated.—Face of drift from bottom of winze at the 1,400-feet level in good working ground, with encouraging ore symptoms. The north drift at the 1,300-feet level is going ahead well.

Crown Point.—The main incline has reached the 1800-feet level, and the north drift at the 1,700-feet level, which is being run to connect with the south drift from the Yellow Jacket Mine is being steadily advanced. The main south drift at the 1,700-feet level will complete connection with the Belcher air shaft very shortly.

Bullion.—Face of East crosscut at the 1,700-feet level, in easy working vein matter, and making good progress towards the ore vein. Drifts north at the 1,400 and 1,500-feet levels, pushing ahead lively, and the drift southeast to connect with the drift north from the Imperial progressing well.

Sala-Potosi.—Daily yield 80 tons from the old ore producing sections. Total bullion yield for August $45,967. Good work is being done sinking the main incline, although the ground is hard and plenty of water to contend with. The erection of the new pumping machinery is also progressing well.

Ophir.—Daily yield, 300 tons of ore, principally from the 1,600-feet level. The various stopes and breasts are looking well, and the east ore body developed at that level shows constant improvement. The west cross-cut near the Mexican line has a good showing of quartz and low grade ore in its face. Main incline sinking at a fair rate of progress, and the ground at the bottom working favorably.

Silver Hill.—The north drift at 444-feet level is being steadily advanced with no special change to note. Water still decreasing. The station at 650-feet level being completed a pump-tank is now being put in. Sinking the main incline deeper will be resumed directly.

In the Sierra Nevada Coal Mine, near Verdi, Nevada, water has been encountered in the shaft at a depth of forty-eight feet. The water is clear and cold, running like an underground spring.

Rich Silver Ledge Discovery.—A rich silver ledge has just been discovered in Ivanpah Cal The specimens assaying $21,000 to the ton.

The American Mining Stock Board announces that its first session for the call of stocks will be held on the 2d of October. A rumor also prevails that the board has under consideration the subject of removing all restrictions as to the classes of stocks in which it shall deal. It seems hardly possible, that an indiscriminate admission of stocks will be allowed, as this would be a most pernicious feature, and would undoubtedly be followed by the introduction of all kinds of "wild cat" schemes in this market.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Sept. 8.	Sept. 15.
Sierra Nevada ...	3,300	100,000	$15	$14
Union Consol'd..	600	100,000	14	14
Mexican.....	600	108,000	35	34
Ophir.....	675	108,000	60	55
California.....	600	540,000	59	59
Consol'd. Virginia	710	540,000	57	56
Best & Belcher...	540	100,800	49	47
Gould & Curry..	612	100,800	15	14
Savage.....	771	112,000	21	20
Hale & Norcross.	400	112,000	12	11
Chollar Potosi..	1,400	28,000	94	91
Alpha Consol'd...	306	30,000	47	45
Imperial Con....	468	503,000	5	5
Yellow Jacket....	957	120,000	27	28
Kentuck	95	000	13	13
Crown Point	541	0,000	11	12
Belcher.....	1,040	04,000	22	22
Overman	1,200	38,400	72	73
Caledonia	2,188	100,000	8	8
Justice	2,100	105,000	22	18
Raymond & Ely..	5,000	30,000	5	6
Meadow Valley...	4,400	60,000	*	1
Eureka Consolid..	....	50,000	13	13
Eureka G. V.....	1,680	20,000	*	*
Silver Hill.....	5,400	54,000	9	9
Julia.....	3,000	110,000	8	7

* We have no quotations of these stocks for the dates given above.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Sept. 14, 1876.

THIS has been a most remarkable week, so far as business is concerned. After a great many weeks of extreme dullness, the market has started, and it looks now as if it was destined to continue so for some time. Calumet is steady and quiet at 160, bid. Copper Falls has rallied from 3¼ to 6½, Sept. 12, reacting to 5 this morning, and closing at 5¾ to 6. Duncan Silver has rallied from 4½, Sept. 7, to 7¾, Sept. 12, declined to 6, Sept. 13, and closes to-night at 7¼ bid, a great many shares changing hands. International Silver rallied from 35c. to 1¾, back to 15-16, and closes to-night at 1¼, bid. National is firmer, and in demand at 1⅞; their annual meeting takes place, for election of officers, October 4, at 2 P. M., at their office, 22 Kilby Street, Boston. Quincy is one point better, at 44, bid. There is also a better demand for the small coppers, and altogether we are inclined to take a very hopeful view of the market.

The reporting mines of the Lake Superior district have handed in the following products for August:

Calumet and Hecla, 1,090 tons; Quincy, 180 tons; Franklin, 110 tons, 540 pounds; Pewabic, 37 tons, 250 pounds; Osceola (reported), 115 tons.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez.....	$50	20 000	$ 6 00	$ 7 00
Calumet and Hecla....	25	80,000	160 00	161 00
Central.....	25	20,000	30 00	31 00
Copper Falls.....	50	20,000	5 50	6 00
Dana.....	25	20,000	10	15
Franklin	25	20,000	13 25	13 75
Humboldt	25	20.000	15	25
Madison.....	25	20,000	27	33
Mesuard	25	20,000	37½	42
Minnesota.....	25	20,000	1 75	2 00
National	15	20,000	1 87½	2 00
Osceola	25	40,000	21 00	23 00
Petherick	25	20,000	37½	50
Pewabic	25	20,000	3 75	3 25
Phenix	25	20,000	12 50	13 00
Quincy.....	25	20,000	44 00	44 50
Ridge	25	20,000	....	....
Rockland	25	20,000	32	40
International Silver.....	20	60,000	1 25	1 37½
Star.....	25	20,000	37½	50
Superior.....	25	20,000	10	15
Duncan Silver	20	60,000	7 25	7 37½
Dawson Silver.....			15	25

Gas Stocks.

NEW YORK, FRIDAY EVENING, Sept. 15, 1876.

No change is reported in the quotations of the New York gas stocks, the general situation of the market remaining about the same as reported in our last

Brooklyn Gas Companies.—A committee has been appointed from the Board of Aldermen to ascertain whether the gas companies are furnishing to the city the quantity of gas they contracted to supply.

Ashland, Pa., Gas Company.—It is announced that this company will declare a dividend amounting to twelve per cent. this year.

Reduction in the Prices of Gas.—The general use of kerosene in different parts of the country, in preference to paying exorbitant rates for gas, is having its effect in bringing the gas companies to an appreciation of the situation for lower rates, as the following announcements will indicate:

Brooklyn Gas Companies.—The Brooklyn Gas Company has reduced the price of gas from $2.75 to $2.50 a thousand feet, making the price still twenty-five cents more than the late reduction made by the Citizens' Gas Company.

The Metropolitan Gas Company, of Atlantic Avenue, have reduced their price to $2.50.

Baltimore Gas Companies.—The gaslight companies of Baltimore have determined to reduce their prices after the 1st of October. Gas will then be furnished at the rate of $2.75 per 1,000 feet, subject to a discount of 25 cents per 1 000 feet—equal to $2 50 per 1,000 feet. The *American* says:—The reduction has been long asked for by the public, and though not fully up to what was expected, will, to some extent, satisfy consumers.

St. Louis Gas Companies.—The price of gas has been reduced to consumers in St. Louis from $3 per 1,000 cubic feet to $2.50, with 5 per cent. off for prompt cash to all who consume less than 50,000 cubic feet per month and 15 per cent. off for those using above 100,000 cubic feet.

Providence, R. I., Gas Companies.—The report of the Board of Directors of the Providence (R. I.) Gas Company, presented at the annual meeting, referring to the reduction of the price of gas to $2.25 per thousand cubic feet, says:—Should an increased consumption or a reduced cost of production of gas justify a still lower price, the directors will not hesitate to order it.

Port Hope (Ont.) Gas Company.—The directors of the Port Hope Gas Company have reduced their prices to $3 75 per thousand feet, if paid before the middle of each month, and if not regularly paid the prices will be $4.50. The former prices were $4 for prompt payment, and $6 when overdue.

Companies out of Town.—The following comprise a list of those companies whose quotations have changed from the rates prevailing in our last:

	Bid.	Asked.
Citizens, Newark.....	90	95
Richmond Co., S. I	97	100
Saugerties.....	100	105
Lewiston, Me.....	50	70

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Jan. '76	110	111
" " Bonds	90,000	1,000	†3½	Feb. '76	102	
NewYork, "	4,000,000		5	Jan. '76	140	142
Metropol. "	2,500,000	100	5	Mar. '76	145	147½
" " Certf.	1,000,000	....	3½	" "	101	102½
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1.850,000	50	4	Feb. '76	110	114
Manhattan"	4,000,000	50	10	July "	242	245
Brooklyn, B'klyn	2,000,000	25	5	June '76	180	185
Nassau "	1,000,000	25	4	Jan. '76	75	80
" " Certf.	700,000	1,000	3½	Nov. '76	95	98
People's "	1,000,000	10	3½	Jan. '76	49	50
" " Certf.	300,000	1,000	3½	Jan. '76	80	85
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	73	74
Wmsburgh "	1,000,000	50	5	Jan. '76	130	135
" " Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's " ...	1,200,000	20	2⅝	Jan. '76	90	95
" " Certf.	320,000	1,000	3½	April "	100	102
J. C. N. J.....	386,000	20	5	July, '75	160	—
Centl. Westch. N.Y.	465,000	50	4	July. "	95	100
Subur'n " "	390,000	50				95

† Gold.

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